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Illumination Levels and Eye Comfort Conditions*

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COMFORT is subjective, individual, negative, equals absence of discomfort, profoundly affected by habit, custom, even fashion. Time is an essential factor in eliciting discomfort. Even more important than level of illumination in many cases is proper distribution (quality of lighting)

IT IS comparatively easy to design an installation for efficiency; somewhat more difficult to design an installation for esthetic effect which will please a given group; much more difficult to design an installation which a given group will at once pronounce comfortable. We must discriminate sharply between comfort on the one hand and efficiency and healthfulness on the other. Comfort standards are not by any means interchangeable with optimum standards without qualification.

What is Comfort?

It will pay us to study what is meant by comfort in general and by eye comfort in particular, before attempting to determine what influence illumination levels may have.

First of all, comfort is a subjective affair. It depends on individual personal preferences. It is not, therefore, predictable. Those conditions which are most beneficial from the point of view of health and efficiency are not necessarily what a person will term most comfortable for him.

In the second place, comfort is a negative affair rather than positive. We have stronger terms for positive feelings, such as: pleasure, happiness, delight, felicity, thrill, rapture. Comfort is freedom

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from objectionable sensations and conditions, or escape from previous discomfort, that is, from painful or disagreeable or irritating conditions. It, therefore, often depends in detail on the previous conditions which become irksome, even painful, the escape from which is comfort.

This negative aspect appears in the various synonyms: repose, ease, relaxation, freedom from irritations and from strain or tension, tranquillity; while discomfort implies the presence of pain in some degree, usually the lowest form of pain: uncomfortable, incommoded, tired, fretted, displeased, bothered, ill at ease, hurt.

In the third place habit and previous experience have a preponderant influence in determining what an individual deems comfort. This is so important it demands illustrations.

Take, for example, eating. We prefer to sit in chairs, but others have preferred reclining; others squatting on the floor. We prefer knives, forks, and spoons, others prefer chop-sticks or fingers; many like to use the knife instead of the fork as a shovel to transfer food from plate to mouth. Or take articles of clothing: here we see the influence not only of habit but of fashion. A hat may be entirely efficient as a protection, but the wearer will be very uncomfortable if it is conspicuously out of style. Women's shoes, bad as they look to us, are pronounced by women to be comfortable, and the wearers would be very uncomfortable, many of them, with efficient footwear scientifically adapted to walking and standing.

So a person who is accustomed to reading or working with a certain type of lighting may complain bitterly when you substitute a better but very different one, just as one who is accustomed to working or reading in a badly ventilated room may be made actually uncomfortable when you take measures to make the air fresh and the temperature normal. There are people still living who can not be convinced that any artificial light is as comfortable as the old student lamp—a kerosene lamp.

A fourth factor in comfort is the time factor. This is very significant. A posture, for example, may be pronounced quite comfortable, but if the person is required to maintain that posture long, it becomes irksome and eventually quite uncomfortable. It is a severe and crucial test of comfort to subject it to the ordeal of time. One of the early methods of testing lighting arrangements, a

method used by Ferree and Rand, was to require the subject of the test to read until he felt discomfort of the lids—a scratchy, sandy irritation due to hyperemia. The criterion was the time required to produce the discomfort. It was found to be a fairly dependable criterion of different types of lighting, direct, indirect, and semi-indirect, the results agreeing with those found by other methods.

Thus a lighting arrangement may seem quite comfortable at first but judgment should be deferred until sufficient time has elapsed to give it a severe test.

We are often confronted with a dilemma of this kind: we design a lighting installation, which we know is good, but the users declare it is not comfortable and is generally unsatisfactory. What shall be done with such cases? Must we permit inadequate, inefficient, inartistic and even actually injurious types of lighting because ignorant, prejudiced, cranky people prefer them and assert that, as for themselves, they are more comfortable with them than with the new-fangled arrangements we prefer?

The key to this dilemma is to be found in the fact that when put to the test, when given a fair trial involving sufficient time, the improved lighting makes reading or working so much easier, speedier, with fewer mistakes and with so much less fatigue that only the most obstinate, perverse, and bigoted old fogies persist in declaring the new way less comfortable.

Thus we are driven to the conclusion that in designing an installation for comfort, we cannot go far wrong if we are guided by what is conducive to efficiency, healthfulness, and esthetic satisfaction, but we must be prepared to encounter the tremendous inertia of habits and prejudices. To overcome a fixed habit may take no little time and all the might of authority and diplomacy you can bring to bear. It behooves us not to be too rigid in our own standards but adapt our designs to the desires of those who employ us. Sometimes it is possible to obtain permission to arrange one room with lighting which is really good. Then those who are at all open to conviction can be converted by actual trial.

Illustrative Case

A man complains that he cannot read long in the evening. His eyes get tired and uncomfortable and he has to stop and listen to

the radio. He wears glasses for reading, as he has a small refractive error and is presbyopic (55 years old). Asked about the lighting of his library where he reads, he says it is very good—"the best there is." Questioning brings out the facts. The room is rather large, 18 x 22 feet in size, with dark beamed ceiling, walls covered with book shelves, and therefore dark—dark leather-covered furniture with dark rugs and hangings. On the table at his left is a handsome bronze lamp with a shade which allows the light to shine directly on his book over his left shoulder as he sits in an easy chair before the open fire. "Yes," he says, "the light is perfect; the trouble is with my glasses."

Exhaustive examination of his eyes shows that the glasses are well chosen. They are such as thousands of others with similar eyes are wearing with comfort.

To convince him that the lighting is not good is no easy matter. In the first place such a room is very difficult to light. The esthetic satisfaction from the present arrangement is a powerful factor. Sometimes it is possible to induce the patient to arrange another room, perhaps a bedroom, with what you think is good lighting, to be tried for a few weeks. Be sure to make it clear that a trial of one evening is wholly inadequate. First, choose a room with white ceiling and very light walls. Install two or three indirect lamps with at least three watts per square foot of floor space—about 1000 watts. If the lamps are properly located with reference to the reading chair, the whole ceiling and the walls down to the tops of doors will be lighted and the ceiling above the chair will be especially light. This will give about 15–20 foot-candles on the book with no glare, no harsh contrasts, no dark spots anywhere in the room. Of course, he will not like it, he will hate it at first. After finding that he can read much longer with much less fatigue and discomfort, he may be persuaded.

The difficulty in convincing such a man is greatly increased by the fact that very many persons can read with comfort the whole evening with the lighting first described. Perhaps other members of the family are doing so. Hence his desire to blame the glasses.

To have the room redecorated with a light enough ceiling for indirect lighting may be refused. The next best thing is a compromise, one of the types of lamp which diffuses the light somewhat.

Types of Discomfort Resulting from Poor Illumination

What form does discomfort take when eyes are made to work under unfavorable illumination? The symptoms are local and general.

The local signs and symptoms are redness, sensations of heat, dryness, scratchiness, sometimes photophobia, all due to, or characterized by, hyperemia, that is, excess of blood to the eyeball and lids. These feelings cause increased winking automatically, since winking is a protective reflex. Hence the value and soundness of the winking reflex test ("blinking," they prefer to call it) of Luckiesh and Moss. There may be increased flow of tears, also a protective reflex. Feelings of fatigue, tired, aching, pulling sensations are described.

The general symptoms are such as headache, restlessness, irritability, sometimes sleepiness and the like. Conspicuous in some cases is an increase in mistakes, and the whole situation merges into the picture of inefficiency and of eyestrain.

As was stated above, a design which fulfills the requirements for efficiency, healthfulness, and esthetic satisfaction will be found to meet the demands for comfort in the majority of cases if the test is sufficiently prolonged to be crucial. Absence of these and similar symptoms spells comfort. Hence we must study the problem: What levels and kinds of illumination produce these symptoms and how can they be avoided in order to achieve comfort?

The level of illumination needed for comfortable seeing depends on: (1) the work being done, and (2) the efficiency of the eyes. The factors to be considered are the fineness of the work (visual angle subtended by the objects), the contrast with the surrounding field, the time factor or speed required, and the accuracy demanded.

The efficiency of the eyes depends on their freedom from errors of refraction (hypermetropia, astigmatism, myopia), from defects of fixation and binocular vision (heterophoria, fusion amplitude), freedom from defects of transparency of the cornea and the other media and freedom from other defects.

Some people with sound, healthy eyes doing ordinary reading say they are perfectly comfortable and can use their eyes indefinitely with a level of five foot-candles; others are not comfortable with less than 15 foot-candles. When the work is more exacting,

finer, less contrasted, more hurried, with accuracy very important, then a higher level of illumination is required—up to 50 or 100 foot-candles, often more.

Again, when the eyes are defective, more light is needed. I sometimes tell a patient: "There are two ways by which you can get relief from the symptoms which are troubling you—you can wear some glasses which will correct a slight refractive error which you have or you can improve the lighting under which you are working." This will surprise some who think eye specialists always give glasses to everybody in whom they detect errors of refraction. The fact is that everyone has some errors of refraction and some aberrations but the eyes are provided with a mechanism for the automatic correction of or compensation for many of these. So long as this is done without in any way overtaxing the mechanism, glasses are unnecessary and the patient is better off without them. I wish to stress at this point the way errors of refraction and other ocular defects bring out defective lighting and vice versa. It may be compared to diet and stomach trouble. It takes a person with a sensitive digestive mechanism easily disturbed to bring out the defects in a meal which would cause no trouble whatever in a healthy individual. Conversely, a poorly cooked, badly selected meal will bring out the digestive troubles which would otherwise not have been apparent. For a person with a good strong digestion, any kind of food will do, but the person with dyspepsia and cranky digestive apparatus must be fussy about what he eats. So, for a person with good strong eyes, any light will do, but the individual with "weak eyes" must be very particular about lighting.

Thus it is possible for well selected glasses to help out a poor lighting arrangement and for a good lighting arrangement to help out poorly selected glasses, or even, in some cases, take the place of glasses.

To sum up the question of what level of illumination is needed for comfort conditions, the answer is that no fixed standard is, in the nature of things, possible. It is convenient and helpful to have codes which state certain standards. It should be understood that, as Luckiesh and Moss point out, "codes imply a degree of definiteness and precision which would be extremely difficult, if not actually impossible, to substantiate by actual test." Personally, I do

not find 10 foot-candles sufficient for my comfort when reading good print. I prefer 20 foot-candles but do not complain much if I have 15. For certain fine work, like examining an eye or operating, 100 foot-candles is needed, but here it is not a question of comfort as the process is short—it is really a question of seeing fine detail.

How Much Illumination is Essential?

I now wish to emphasize as strongly as possible that illumination may be at an optimum level (say 20 foot-candles for reading in my own case), and yet be very uncomfortable. The importance of the level of illumination is overemphasized by many engineers. Admittedly, it is the most important single feature in illumination—the light must be strong enough to see by!

In brief, it may be stated that the amount of light required depends on the eyes and on the work. The eyes have to be considered in deciding on the level of illumination because, if the eyes are deficient, they need more light. This has been so conclusively demonstrated so many times that no further argument is needed as to the validity of the general proposition. For such a standard task as reading 12-point type (as this article is set) on good paper, 10 foot-candles will do—15 foot-candles is better (assuming normal eyes). When the work is finer or when the contrast is less, more light is needed. When speed is required and when accuracy is important, more light is needed.

Of course, daylight out-of-doors is much brighter. This does not prove that the eyes need an equivalent level of illumination for efficient work. The eyes are marvellously adaptable to different levels of brightness and the only way to settle such a question is by actual trial, not by theory. On the other hand, the fact that the eyes perform satisfactorily in bright daylight shows that there is no danger of getting artificial light too bright provided its distribution is correct—properly diffused and free from glare.

Importance of Light Distribution, Quality of Lighting

The factors, aside from brightness or level of illumination, which determine comfort in the use of the eyes are extremely important. They are important not only for comfort but for health and efficiency, and yet they are not stressed by engineers nor by salesmen

who sell electricity for lighting or fixtures for lighting. These salesmen are the people to whom the public turn for authoritative information. They expect those who sell lighting equipment to give expert and sound advice about it. What they are advised to buy is something that is "the latest thing" or something that is going to save several cents an hour or something that "everybody is buying."

It is the distribution of the light that is so all important for comfort and for avoidance of eye strain. Luckiesh and Moss have adopted the term "quality of lighting" to cover this and it seems to me a good term. In the past, we have spoken of quality of light (not lighting, note difference) as depending on wave-length, *i. e.*, spectral quality.

The importance of the wave-lengths has been much exaggerated. It has been assumed that daylight must be of better wave-lengths than ordinary yellowish artificial sources. So it is far better for color matching, but for comfortable, efficient, and healthful use of the eyes the yellowish light of most artificial sources, such as ordinary Mazda bulbs, is better than the "daylight bulbs."

This is not surprising since the retina has a selective sensitivity to the central part of the spectrum—yellow green—in spite of the fact that the eye was developed under conditions of natural lighting long before artificial lighting was invented.

The most widely recognized defect of distribution of light is glare. It is too much light in the wrong place. It results in discomfort and even eyestrain.

In artificial lighting it is usually possible to avoid glare from exposed sources within 20 degrees or 30 degrees of the line of sight. What is not widely appreciated is that a subtle form of glare comes from lights that are bare, exposed sources even if wholly outside the field of vision when at work. In many cases, this is explained by the specular reflection from the work, but even when so located that the specular reflection is thrown away from the eyes of the worker there is still a cause of discomfort and eyestrain when the source of light is a small one and therefore a concentrated and relatively intense source. Of course, the remedy for this is a large source or many small sources so arranged as to be virtually one large source. This means diffused light.

If we try to understand why this is true—how it works—we see

at once it is not because the bright source irritates the eye directly, since it is not visible when looking at the work. Therefore, it must be due to the light from the work—a page of a book, for example. Does it make any difference to the eyes if a page is illuminated with light of a certain brightness, let us say 30 foot-candles and free from specular reflection, whether the source is small or large, single or multiple? The answer is yes. If the majority of those who use this arrangement have strong, tough, healthy eyes, they will notice no discomfort even after prolonged use. Recall what was said about cooking for dyspeptics and for healthy people. If we want to measure this effect, we must have a sensitive meter. We have to rely on subjective tests to prove the facts; objective tests may be used to judge the installation.

How does concentrated light produce a different effect on the eyes? There must be something about the way the paper and print look that is different. It is usually described as, on the one hand, a hard trying effect when bad, and when good, as a soft agreeable effect. In some cases the texture of the paper is such that an almost infinite number of small shiny surfaces are present, visible with a microscope but not noticed with the naked eye. At other times slight curvatures of the surface may produce minor specular effects. Nearby surfaces may be specular. Whatever the explanation, there is no doubt of the fact that concentrated sources produce harsh, hard effects, strong contrasts, sharp shadows and discomfort and eyestrain.

An engineer needs no test to decide whether or not a given installation supplies diffuse lighting—he sees at a glance. For the layman, a test is useful and the Lancaster shadow test, described years ago, is a simple and effective one. A pencil is held parallel to and a handbreadth from a sheet of white paper which is held in the other hand so that it is at right angles to the incident light. The shadow of the pencil will be sharp and well defined if the source is small and concentrated, but the shadow will be blurry and indistinct in proportion as the source is large and the light diffused. What the eyes prefer is the soft agreeable effect of the diffused light which comes from a large area, for example, out-of-doors from the sky; indoors, from a large window or windows, not too far off, or from a white ceiling and walls, etc.

It is difficult to get a high degree of brightness, say 100 foot-candles, indoors with indirect lighting without producing glare from the excessive brightness of the ceiling and walls. If the work is such that the ceiling is out of sight, and if the lower part of the walls and the floors and furniture are of a neutral tint, neither too light nor too dark, a high degree of illumination is possible with indirect lighting.

A common fault in indirect lighting is throwing a beam of light on a comparatively small area of the ceiling. This becomes the direct source and is small enough to be equivalent to a large direct luminaire and to cast a fairly defined shadow. The indirect luminaire should be so designed that the beam spreads out over the whole ceiling and the walls down to the tops of the doors. This often calls for more than one luminaire per room.

For higher levels of general illumination, one can use semi-indirect luminaires if they are installed with care so as not to be in sight and so that the whole ceiling and walls are lighted.

For still higher levels of illumination, it is necessary to resort to what Luckiesh and Moss call "Lighting Plus," *i. e.*, local direct lighting in addition to the general illumination.

Summary

Comfort is subjective and cannot be measured objectively. It is negative rather than positive, depending on the absence of things that are irksome, offensive, painful. It depends very largely on habit and even fashion. Time is important since what is at first comfortable may, if subjected to the ordeal of time, prove very uncomfortable.

Experience shows that what is conducive to efficiency, healthfulness, and esthetic satisfaction will prove in the long run comfortable when the inertia of habit and prejudice has been overcome.

The level of illumination most conducive to comfort cannot be stated in definite figures of universal application because it depends on the eyes (eyes with defects need more light) and on the task (more difficult and exacting tasks need more light).

Comfort is more likely to suffer today from poor distribution of light than from improper level of illumination. For comfort, light must be diffused. Individuals vary. Those with strong, healthy

eyes, not overworked, are satisfied with any old light. For sensitive tests, sensitive eyes are needed. This is very important since many people can work with inadequate lighting without eyestrain or even discomfort, but those with vulnerable eyes may suffer seriously. To attempt to set a definite standard in foot-candles is therefore to attempt the impossible. The illumination must be adapted to the task and to the peculiarities of those who are to perform it. The competent engineer will realize this and will make it clear to his clients.

One-Eyed Drivers

H. R. DeSilva, W. H. Frisbee, Jr., and P. Robinson

THE one-eyed driver differs from the normal driver in that his field of vision is much more limited, he is more susceptible to glare, and his depth perception is notoriously bad

ONLY about 20 states make any check on vision for the driver's license. Nearly half of these states that require visual tests are in the northeastern section of the country. There is, however, no agreement regarding visual standards. The prescribed requirements for visual acuity for one eye vary all the way from 20/20 to 20/70.

Minimum Acuity Standards

One-Eye	
20/20:	Delaware, Rhode Island.
20/30:	Connecticut, Maine, Arkansas, Iowa, Kansas, Nebraska, South Carolina.
20/40:	Maryland, New York, California, Oregon, Virginia.
20/50:	New Jersey, Washington.
20/70:	Massachusetts.

FIGURE 1

A reason for the absence of uniformity lies in the lack of attested facts on the part played by vision in driving. The standards suggested by different individuals or agencies also do not conform with one another.[3, 10, 13, 16] The fact that they vary among themselves and are based upon insufficient research shows the need for further investigation.

Suggested Visual Standards

	UNRESTRICTED LICENSE			RESTRICTED LICENSE		
Suggested By:	One-Eyed	Better Eye	Worse Eye	One-Eyed	Better Eye	Worse Eye
Amer. Med. Assoc.		20/40	20/100		20/65	
European		20/40	20/200			
Lauer, Dr. A. R.	20/30	20/30	20/50		20/60	20/80
Mason, Dr. R. E.	20/30	20/40	20/100			
National Safety Council	20/20	20/30	20/30	(glasses) 20/20 20/30		
Sherman, Dr. E. S.				(daylight) 20/40		

Figure 2

It has been estimated that from one to two per cent of all motorists are one-eyed, whereas from 20 per cent to 40 per cent have a deficient eye which handicaps them in driving. No state prohibits either group from driving. The facts about the driver with only one eye will be discussed in the first part of the paper, followed by findings regarding the driver with a deficient eye.

The One-Eyed Driver

Hazards of the One-Eyed Driver.—A person with normal eyes has a field of vision of about 190°. The one-eyed individual, on the other hand, has a field of between 110° and 135°, depending partly upon the protrusion of his good eye and the bridge of his nose. The person with pop-eyes and a small nose will naturally see farther around his nose than a person with deep set eyes. On account of the loss of vision for detail toward the periphery, the useful vision for either the one-eyed person or the normal person is usually much less than the figures above. Figure 3 illustrates the approximate perspective of the two-eyed person; of the person with only a right eye, and of the person with only a left eye.

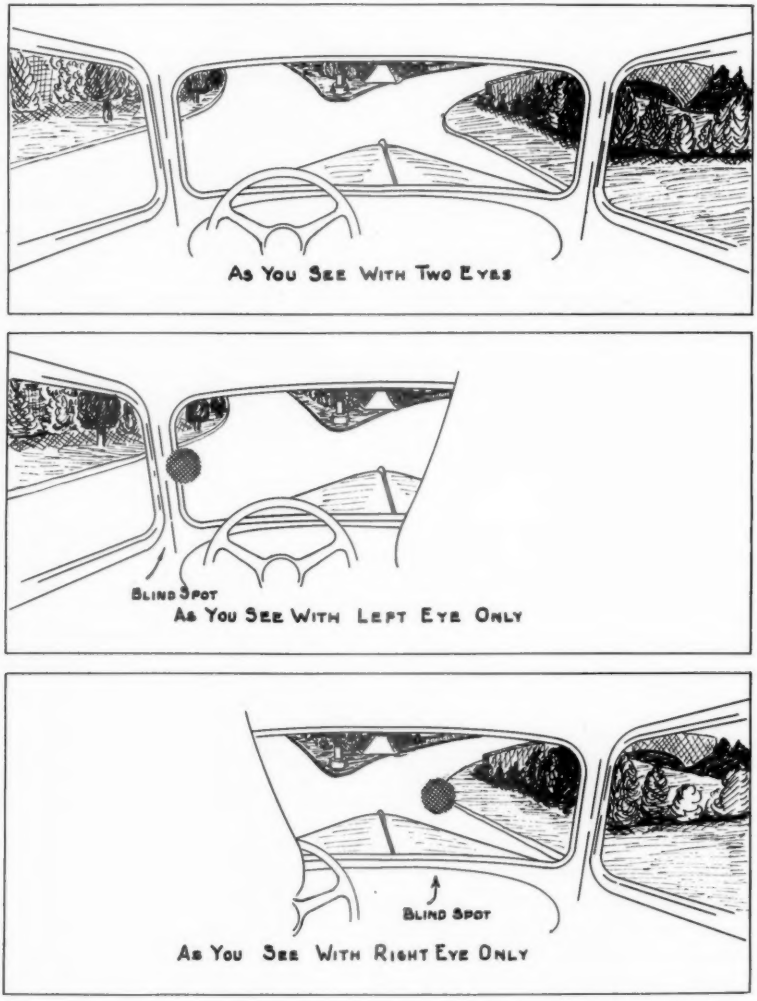

As You See With Two Eyes
Blind Spot
As You See With Left Eye Only
Blind Spot
As You See With Right Eye Only

FIGURE 3

The most obvious compensation for the handicap of having one eye is for the driver to keep his head turned at an angle so as to spread his visual field evenly on both sides. Many one-eyed persons do not compensate nearly enough, since turning the head attracts attention and they are anxious to conceal their defect. Another form of correction possible is to keep the head and the eyes roving continually from right to left while driving in order to bring possible dangers from the side into the field of clear vision of the good eye. This habit is unfortunately not common enough among one-eyed persons.

The hazards of driving are not the same for the right-eyed and left-eyed driver, since we steer our cars from the left-hand side and drive on the right side of the road. For convenience, we are listing the various hazards as they affect the right-eyed driver more than the left-eyed driver, and vice versa.

> **Left-eyed persons** with deficient or blind right eye have difficulty: (1) In perceiving pedestrians stepping off sidewalk, or walking along the roadway either by day or night; (2) in viewing road when making a right turn; (3) in perceiving cars approaching from the right of intersections; (4) in passing other cars (apt to cut in too soon or clip rear bumper in cutting out); (5) in perceiving road signs and traffic lights; (6) in backing out from angle parking; (7) in perceiving cars parked at an angle backing out; and (8) in keeping on right side of road (on account of inability to see edge of road easily).
>
> **Right-eyed persons** with deficient or blind left eye have difficulty: (1) In perceiving pedestrians on account of losing them in blind spot; (2) in viewing road when making a left turn; (3) in perceiving cars approaching from the left at intersections; (4) in avoiding oncoming cars (since they guide by right edge of road); (5) in perceiving road signs, on account of losing them in the blind spot; (6) in backing out from parallel parking; (7) in perceiving jaywalkers in middle of road; and (8) in watching traffic in rear mirror when located on side, as in a truck.

Blind Spot.—We are blind in a small round region of the eye where the optic nerve enters the eyeball. As illustrated in Figure 3,

the blind spot is located to the right of the right eye fixation point and to the left of the left eye fixation point. In using both eyes, anything falling within the blind spot of one eye is visible to the other eye, and vice versa, so that the two eyes perceive an uninterrupted field.

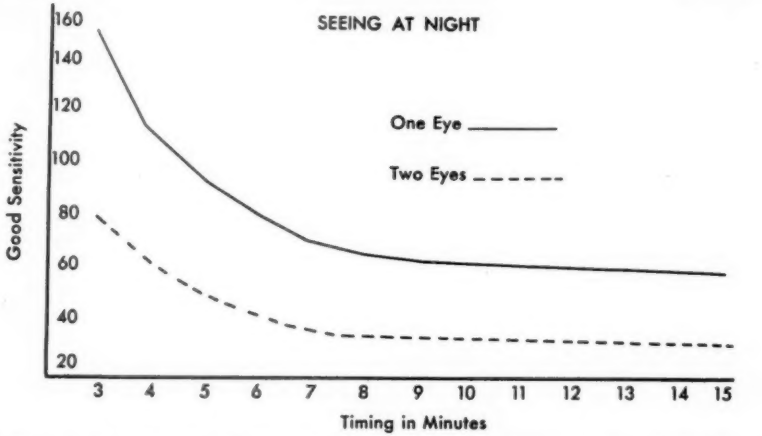
The one-eyed person, however, has no good eye to perceive the field not seen in his blind spot, so he is really blind in the respective spots indicated on the windshield in Figure 3. The blind spot covers an area that is approximately 7° in diameter. Thus, whereas on the windshield the blind spot covers an area of only two or three inches, at a distance of 50 feet it covers an area of six feet. For example, a standard road sign (12″ x 18″) falls within the blind spot as close as 12 feet, a standard stop sign (24″ x 24″) at 16 feet; a child (4 feet tall) at 32 feet; a man (6 feet tall) at 48 feet; a truck (7 feet high) at 57 feet.

Hence the one-eyed person is likely to miss something which is obscured by his blind spot until it is too close for him to avoid by halting or swerving his car. The only possible way a one-eyed driver can overcome the blind spot hazard is to keep his eye moving constantly so as to expose all oncoming objects on sensitive parts of the retina.

Night Driving.—Either of two defects—night blindness or glare blindness—makes it impossible for a motorist to drive with comfort and safety after dark. The one-eyed person is handicapped even more. In fact, he has more difficulty than the average driver who does not have either defect. One investigation has shown that one eye cannot withstand glare as well as two.[12] The difference is quite marked.

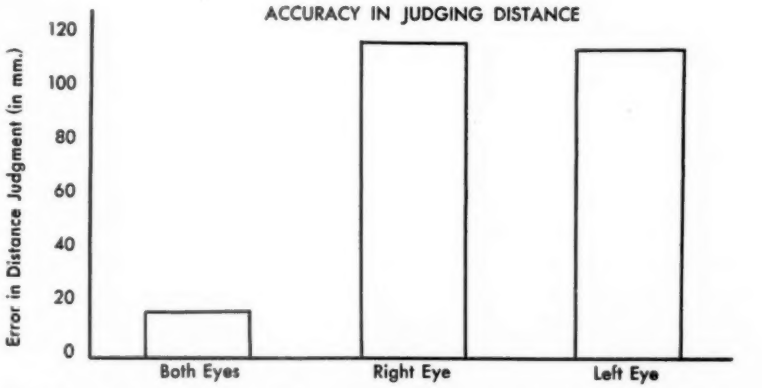
Not only is a one-eyed person more sensitive to glaring lights, but it takes him much longer to recover from the glare and see the road clearly again. Two eyes can see in the dark about twice as well as one.[5] (See Figure 4.) In other words, at night the one-eyed driver cannot see objects on the road as quickly or as distinctly as the two-eyed person. Hence it behooves the one-eyed motorist to drive as little as possible at night.

Speed of Seeing.—When an object is exposed for a very short period of time, the two eyes can perceive it in about half the time that one eye can.[11] Thus the ability of the two eyes to grasp



This chart indicates the differences in adaptation time to darkness when using one eye or both eyes. As the eyes become adapted to the darkness, it is possible to see more clearly, but the two eyes are almost 50% more sensitive than one eye. Two eyes can therefore distinguish dim objects on the road (such as pedestrians) more easily and quickly than only one eye.

FIGURE 4



When using only one eye, the errors in judging distances are much greater than when using both eyes. This chart is based on work done with test for distance judgment in the U. S. Army.

FIGURE 5

quickly an emergency situation is distinctly superior to the one eye alone.

In driving it is frequently necessary to shift the eyes from the road to the instrument panel. An investigation of the speed of focussing back and forth on a far and then a near object gives the two eyes a clear victory over one eye.[15] This speed of adjustment of the eyes is also lengthened by advancing age and fatigue.[8]

Depth Perception.—One-eyed persons are notoriously bad in their judgment of distance and depth. On the depth perception test used by the U. S. Army in selecting aviators, it was found[6] that the average error of one eye is 6 to 10 times greater than the error for binocular judgment. (See Figure 5.) The judgments of the one-eyed persons are nearly always underestimations, that is to say, the object appears closer than it really is.[4] It is fortunate that the one-eyed person perceives things as closer rather than farther away, since it is better to stop short than to overrun a dangerous obstacle.

The Driver with a Deficient Eye

The Proportion of Drivers with a Deficiency in One Eye.—The problem of the one-eyed driver is not so important as that of the deficient eyed driver since there are so many more of the latter. Whereas only one or two per cent of our drivers are one-eyed, our results show that 30 per cent to 40 per cent of drivers have a visual acuity of 20/30 or less in one or the other eye. At least 20 per cent of our drivers have a visual acuity ranging from 20/40 to 20/200 in either one or both eyes.

The significance of a deficient eye is commencing to be appreciated as a result of recent studies in motor vehicle departments. In an investigation made by the California Department it was found that 20 per cent of all the motorists involved in fatal accidents in San Francisco had an acuity of 20/30 or less in one eye. On checking the nature of the accidents the figures showed that the collision took place on the side of the weak eye in every case. Moreover, no driver realized that he had a weak eye.[9]

Check-ups of 70 drivers apprehended for "cutting in" on Los Angeles highways revealed that half of them (35) had defective right eyes.[2]

Effects of Deficiency in One Eye on Driving.—Tests by army medical men at Mitchell Field showed that aviators with the most acute vision had the best depth perception.[6] Other studies have shown that any loss of visual acuity in either eye or in both eyes tends to render depth perception more difficult. For example, one investigator holds that with one eye normal an impairment of vision by 20/30 in the other eye injures depth perception and that an impairment of vision in one eye of 20/70 makes it almost impossible for the two eyes to work together to give an efficient perception of distance and depth.[1] In other words, we need two almost perfect eyes to perceive depth effectively. It has been noted that the effect of the aging process on the eyes in reducing acuity and leading to far vision also impairs depth perception in both normal and deficient eyed persons.

The speed of the eyes to pick up objects as they rove up and down the road in driving has been shown to be much slower when one eye is below par. In other words, since the perceptual time is poorer in the person with one deficient eye he is likely to be less alert in apprehending less obvious dangers.

Compensation and Improvement.—It has been claimed by some medical authorities that a person who has always been without one of his eyes has a better depth vision than the person who loses an eye after he has had years of binocular experience.[7] This is probably to be explained by the fact that the person with the congenital loss has had more years of experience than the person with the later accidental loss.

At any rate, it has been clearly demonstrated that it takes several months, six at least, for a person who has lost one eye to recover some of his ability to deal with near and far space.[14] The lesson from this is that a person who loses one eye should not be allowed to drive a car for at least six months or perhaps a year, until he has had a chance to re-educate himself.

Wiley Post was an excellent aviator before he lost his vision. After losing it he practised diligently and eventually recovered his depth perception well enough to fly a plane skilfully again.

Fortunately, it is easier for a one-eyed person to adapt himself to a moving judgment of depth, such as is necessary in driving a car, than to a judgment of stationary depth as is called for on most

tests for depth perception. Probably the most important of all of the factors by which we judge depth in a moving automobile is parallax or the judgment of distances determined by the rate of movement of objects with reference to one another. This judgment of relative rate of movement of objects is a dynamic, constantly changing judgment. On this account the one-eyed person can continually check his judgments by noting his under- and over-estimations as objects approach and pass him, and also by moving his head from right to left to get the same kind of stereoscopic depth perceptions available to the two-eyed person.

Conclusions

The results presented outline the various handicaps of the one-eyed and the deficient-eyed drivers. Unquestionably, most of these drivers are oblivious to the defects which predispose them to accidents. The greatest human hazard arises not from the defects but from ignorance of the dangers from such defects. For most of these drivers the solution lies in personal re-education adapted to their individual needs. For others, and especially those who have shown themselves incapable of profiting from re-education, the solution lies in revocation of their licenses.

Bibliography

1. Adler, H.: *Clinical Physiology of the Eye.* New York: Macmillan, 1933, p. 240.
2. Bagby, S.: "I Didn't Think," *California Highway Patrolman*, June, 1937, p. 35.
3. Baker, J. S.: "Public Safety Memo. 42." National Safety Council, Inc., February, 1938.
4. Carr, H. A.: *An Introduction to Space Perception.* New York: Longmans, Green and Co., 1935.
5. Cook, T. W.: "Binocular and monocular relations in foveal dark adaptation," *Psychological Monographs*, xlv, No. 3, 1934.
6. Deyo, B.V.: "Monocular and binocular judgment of distance," *American Journal of Ophthalmology*, p. 343, May, 1922.
7. Grazianskaia, L. H., and Rosanova, E. P.: "Determination of adjustment to absence of binocular vision in vocational selection," *Sovietskii Viestnik Opht.*, viii, pt. 3, p. 469, 1936.

8. Luckiesh, M., and Moss, F. K.: *The Science of Seeing.* New York: Van Nostrand, 1937.
9. Mason, Paul: "Drivers' tests." Society of Automotive Engineers, West Coast Regional Transportation and Maintenance Meeting, November 18–19, 1937. Reprint.
10. Mason, Dr. R. E.: "Minimal visual requirements for safe driving," *Journal Missouri State Medical Association*, 32:367, 1935.
11. Richmond, P., and Ebert, E. C.: "Speed of visual perception," *United States Naval Medical Bulletin*, 31:150, 1933.
12. Sheard, C.: "Glarometric measurements on ocular photosensitivity," *American Journal of Optometry*, 8:281–9, 1936.
13. Sherman, Dr. E. S.: "Visual requirements for automobile drivers," *Journal Medical Society of New Jersey*, March, 1937, p. 177.
14. Tumarkina, M. A., and Ostrovskaja, M. H.: "Vocational efficiency of one-eyed people," *Viestnik Opht.*, 10: pt. 1, 143, 1937.
15. Van Tuyl, M. C.: "Monocular perception of distance," *American Journal of Psychology*, 49:515–542, 1937.
16. Weymann, M. F.: "Visual requirements for automobile drivers," *California and Western Medicine*, 35:101, 1931.

Organization of Social Forces for Prevention of Blindness*

Audrey M. Hayden

VIGOROUS and persistent action on the part of the Illinois Society for the Prevention of Blindness succeeded in stirring the imagination and the sympathy of the voting public and led to the passage of highly significant sight-saving legislation

SOMEONE has said that no one can hear that two-thirds of all blindness is preventable without experiencing some sort of an emotion. Either it takes the form of astonishment that so little is being done about it, or it assumes the opposite extreme of a burning indignation or divine pity inspiring action—vigorous, persistent, and effective.

Perhaps the reason there is more of astonishment and less of burning indignation is that blindness with all of its fearful implications is not borne in on our consciousness very often.

Two years ago last fall I was in Jacksonville at the Illinois School for the Blind. As I came out of my room to go down to dinner I suddenly heard strains of the most beautiful organ music coming from the auditorium. I went down the hall to see who it was at the organ. I opened the auditorium door, only to be met by blank darkness—but as my eyes became accustomed to the dark I saw that two little boys, about 12 and 14, were at the organ. My first impulse was to turn on the light. And then I realized with a sinking of the heart that it was too late to turn on the light for those two boys.

In that moment, as I realized the dreadful loneliness of the dark, I felt that no work could be too hard, no detail too tedious, no

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effort too great, if, as a result, we could head off this frightful calamity for other children in our state.

In that little story is the heart beat which keeps prevention of blindness alive, and I am of the firm opinion that it takes just such a strong emotional drive to motivate a program of this kind. No social forces will be mobilized without it—better and more lasting results will be obtained with it and because of it. It will lend urgency to any plan because it will make us feel that the time is short and the task is great. It will fill us with an impatience which will be a spur to progress.

I remember once complaining bitterly to a friend about the slow mental processes of a certain state official who took his own time about a decision which involved eyesight, and she said to me, "Calm yourself—he thinks in decades and you think in minutes." We must all think in minutes where blindness is concerned, since speed on our part may mean all the difference between darkness and light to many individuals.

In mobilizing public opinion for prevention of blindness, just what is our goal?

We cannot rest on our oars until the day dawns when our whole social fabric is permeated with information as to the symptoms of impending eye disasters; how much blindness is preventable; how it is prevented; and where to go to get the best advice.

How do we set the wheels in motion for such an educational program?

Well, if I were asked what was the quickest and most effective manner in which to educate the public on this issue, I should say, without a minute's hesitation, "A strong legislative program." This program, if ably and simply interpreted, first to the legislators and through them to their constituents (or in case of trouble—through the constituents back to the legislators), would, it seems to me, be the best way to dramatize the issue and give it vitality.

What bills should such a program contain?

Possibly four basic pieces of legislation should be included:

(1) An enabling act for sight-saving classes which would provide: (a) an adequate state subsidy; (b) requirements for teachers' training; (c) provisions for transportation so that rural communities could have consolidated classes; and (d) provision for ade-

quate supervision by the State Department of Public Instruction so that standards could be inaugurated and maintained.

(2) A mandatory Silver Nitrate Bill, and by that I mean a statute, not board of health regulation, with no exempting clauses, yet so carefully worded that it does not run counter to medical practice acts which specify that a physician cannot be dictated to in regard to the use of drugs.

(3) A law to provide for the control of trachoma in states where it presents a real public health problem.

(4) A law to limit the sale of fireworks to pyrotechnical experts.

All I know about how such a program is translated from impulse into reality is what I have learned in the "School of Hard Knocks," by actually trying to put sight-saving legislation on the statute books of Illinois; and in the hope that our experience may help other states, I have tried to analyze our failures and successes in such a way that they may be of service.

In placing such a legislative program before a state legislature, I think the least controversial measure should be taken first so that a pleasant acquaintance can be cultivated with the members of the House and Senate. Our School Bill was put through the 1929 session of the legislature with a vote of 135–0 in the House and 41–0 in the Senate. This bill went through on a straight lobby with no community organization and no pressure. Everyone of the 135 men in the House and the 41 men in the Senate who voted for the measure received a personal letter of thanks from the President of the Illinois Society for the Prevention of Blindness. Every time a new sight-saving class was opened in the state they were informed and thanked again. Every time a member of the staff of the Illinois Society went to a town where a legislator lived he was visited and made to feel that he had been responsible for some mighty nice work. In other words, gratitude is a powerful weapon in the mobilization of social forces.

When, two years later, in 1931, we took a bill to the legislature to prevent blindness in newborn babies, even though the bill was controversial, in that it was opposed by a powerful anti-medical lobby, we were in the midst of friends who felt that they were our partners in prevention of blindness.

The bill provided that "every doctor, midwife, or nurse attend-

ing at the birth of a child in the State of Illinois instill or have instilled into the eyes of the baby, within an hour after birth, a one per cent solution of silver nitrate, or some equally effective prophylactic for prevention of blindness from ophthalmia neonatorum, approved by the state department of public health."

This bill was drafted by a constitutional expert. It was flexible in its wording so that it did not run counter to the Medical Practice Act. It named the approved treatment but gave a choice, always providing for approval by the department of health. If a better antiseptic cleanser than one per cent silver nitrate is discovered, our law will not have to be changed.

Almost immediately anti-medical opposition to the bill crystallized. The legislature in 1931 was literally snowed under with letters from our opponents, asking the members of both houses to vote against the bill on the ground that it was an invasion of personal liberty (a very sinister argument to fight, by the way). But with a ten-year record of 1,294 babies in the city of Chicago alone who had been hospitalized by our society, all suffering from an infection which they need never have incurred, and with a memory of 77 other babies who would never see as long as they live because their eyes had not been properly treated at birth, we lobbied the bill through the legislature with a vote of 105–6 in the House and 36–6 in the Senate.

After holding the bill to within 12 hours of the deadline for signature, the attorney general returned the bill to the governor with the opinion that it was unconstitutional, and the governor vetoed it. Because the men in the House had been so thoroughly convinced of the good the bill would have done, they shattered a precedent of 40 years' standing and passed the bill over the governor's veto by a vote of 116–9.

It was necessary to get 34 votes to over-ride the veto in the Senate and all we could muster was 28. One of the senators, a man who was returned by the churches of his district, got to his feet and said, "You gentlemen have been listening to the kind of lobbying in this bill that doesn't get you very far politically."

As I sat in the gallery and listened, I thought how stupid we had been to believe that just because a bill was good, that just because a bill would save human suffering and the taxpayers' money, its

passage was assured. I saw, in that moment, that straight lobbying was not enough on a controversial measure, that educating the legislators was not enough—that the whole state had to be educated so that no representative of the people would dare to make a statement like that again. I saw that we had to demonstrate that a bill which saved helpless babies from a lifetime of darkness was loaded with political dynamite.

I give this background because the story told here furnished us with the ammunition for our future organization, and that is a very important item in mobilizing social forces.

In the midst of our despair we had a gift from heaven. Mr. James Weber Linn, of the *Chicago Daily Times*, heard of the vote and took his pen in hand and wrote a column called "The Pen Sword," which said:

"The governor vetoed the bill to make the treatment of the eyes of newborn babies compulsory. He said the attorney general was not sure that the bill was constitutional, and the fear of any unconstitutional legislation makes the governor shudder.

"Blindness is a sad affliction. The blind cannot rejoice in the changing colors of the sunset or the infinite yet intimate glory of the stars; they cannot perceive the blueness of the sky, though they can feel the chill of rain; they cannot perceive the faces of those they love, and who love them; they must wander always in blackness. But to the governor, no doubt, they suffer under an affliction even worse than any of these: they cannot read the constitution of the State of Illinois.

"It is a wonderful thing to be born without imagination; a wonderful and a comforting thing. No man born without imagination ever loses any sleep thinking of the preventable misery of others. No man born without imagination, even if he is a governor, ever wakes in the dark and wonders what it would be like to know darkness only, darkness to the end, starless darkness stretching universal. No man born without imagination, even if he is a governor, ever thinks of his pen as a poisoned sword with which he may put out thousands of eyes at a stroke. No man born without imagination, even if he is a governor, ever sees himself eclipsing the sun in a thousand skies, building a narrow wall around the hopes of youth, fashioning a nightmare for a child's dream."

As I read those words I thought, if a man who had never seen a case of baby's sore eyes—who had never been near Springfield during all the fight for the bill—could write like that about it, we

weren't defeated yet, and we decided that we would not drop the fight—only next time we would have community organizations and an informed electorate behind us.

Illinois has 51 legislative districts and we decided that we would organize standing committees in each one of those districts, made up of key people who would represent the Legion, the Parent-Teachers Associations, the women's clubs, the churches, the men's service clubs, nursing and medical societies, besides prominent individuals influential with members of the legislature and state officials.

We planned through these key people to educate the groups they represented.

We planned to make the Silver Nitrate Bill a political issue. I am always annoyed by people who say superciliously, "Oh—don't you hate to get mixed up in politics?" My answer is always, "If politics are the tools with which blindness will be prevented, then we wouldn't scorn to use them."

What material did we use for educational purposes?

(1) We went to the League of Women Voters and asked them to include the vote on our bill in their Digest on the ten most important bills of the 1931 session. They did this and we bought up 25,000 copies and marked them for the 51 legislative districts for circularization throughout the state.

(2) We ordered 25,000 copies of the James Weber Linn editorial.

(3) We ordered 25,000 copies of two other editorials that had come out in the *Journal* of the American Medical Association and the *Survey*.

In the fall of 1931 three of us started out and did not stop until December of 1932, when we had completed the organization of a committee of 3,114 members who in turn represented about one and a half million votes. This was slow, painful work. We had from half an hour to one hour's conference with every one of these 3,114 committee members. We made them feel that they were enlisting on a crusade. We made them feel responsibility in their own group. And, believe me, those hours were not wasted.

In the summer of 1931 we took the adverse opinion of the attorney general to the constitutional law department of the University of Chicago and asked them to give it intensive study. If

they considered the opinion sound, we proposed to redraft our bill—if they considered it clearly a prejudiced opinion, we proposed to take the very same bill back to the legislature in 1933.

The attorney general, who had rendered the opinion in 1931, was running for governor on the Republican ticket in the primaries of 1932. In January of 1932, Professor Puttkammer, of the University of Chicago, called us up and told us that, after exhaustive study, the constitutional law department had decided that the opinion did not hold water and that they had decided to publish a two-page editorial in the *Illinois Law Review* for February, analyzing the opinion and showing up its legal weaknesses. Since the attorney general was opening up his Chicago campaign headquarters on March 1, we prevailed upon the University of Chicago to hold up the editorial until the March 1 issue. Then we called in all the metropolitan dailies and gave them the story. The story was so good that it made the front page of all the papers. We wrote and thanked the papers for the news items and asked if they could find it in their hearts to give us an editorial. Three of them did! We immediately circularized all three editorials to our 3,114 committee members. Needless to say, this publicity at primary time cooked several political geese, among them the attorney general who was running for governor. The *Chicago Tribune* ran an editorial called, "Little Drops of Silver Nitrate," which pointed out that the former governor and attorney general had thought that the Silver Nitrate Bill had no political significance and now, too late, they had awakened to the fact that the bill was full of political gun powder.

The use of news items and editorials in arousing public opinion is effective only if the stories are dramatic and the interpretation is accurate, and if they are circularized intelligently.

Along with our campaign to organize the standing committees we ran a public speaking campaign all over the state. In that year and a half over 400 talks were given, telling just what happened in 1931. At each talk the speaker would give the vote in the particular district in which she was speaking and make a plea for those present to write letters to their legislators, either thanking them for a positive vote or asking why they had voted against the bill. I believe that the ordinary voter has no idea what a power he wields, and

in mobilizing social forces that power can well be made clearer to the electorate.

Before the elections, campaign promises were obtained from those who were running for governor. The men who were running for attorney general were visited by prominent individuals and were told the whole story of the Silver Nitrate Bill. The editorial in the *Illinois Law Review* was brought to the attention of the men who were running for the latter office.

And so we went back to the legislature of 1933 with the same bill—but behind it this time was the weight of newspaper publicity which had been intelligently directed and circularized; a standing committee of 3,114 people, all excited about the issue and anxious to do their bit in molding public opinion. All these committee members had been furnished with facts in simple form so that their work would be a potent factor and not just a waste of breath.

And it paid. One member of the legislature asked me one day if I had the country roads patrolled at nights to get votes for the bill, and when I asked her what she meant, she said that the previous week the lights on her car had gone out on a lonesome county road at 10:30 at night. The friend who was with her stopped a passing car and asked the driver to tow them into Downers Grove, ten miles away. The man said, "Oh, so that's Mrs. O'Neill, is it? Well, I want to talk to her." He came over to Mrs. O'Neill's car and said, "Mrs. O'Neill, I'm Dr. Jones from Naperville. I'm the head of the DuPage County Medical Society, and before I tow you into Downers Grove I want to know what you are going to do about the Silver Nitrate Bill." We hear a lot these days about community organization. There is a museum example of it.

The bill passed the House by a vote of 109–6 and the Senate, 38–2. The attorney general ruled that it was constitutional, and the governor, who was subjected to heavy pressure against the bill, signed it on the eighteenth day of April, 1933, and it became the law of Illinois on July 1 of that year.

There is no gainsaying the practical results of mobilizing public opinion for a legislative program of this kind. Before our School Bill became a law there were 10 sight-saving classes, poorly equipped and manned with untrained teachers, limited to the city of Chicago. Since the law became effective in 1929, we have opened 66 sight-

saving classes in 25 cities and the appropriations have grown from $26,000 to $283,600.

Before the Silver Nitrate Bill became effective in 1933, we used to have from 8 to 12 babies a year blinded from ophthalmia. Since the law became effective five years ago this July we have had two blind babies.

Before the Trachoma Law was passed in 1935, we had no diagnosis and no treatment except at the Illinois Eye and Ear Infirmary in Chicago, situated 400 miles away from the trachoma district in Southern Illinois. We now have 3,000 positive trachoma cases under treatment and 1,000 suspects under observation in five trachoma clinics in Southern Illinois.

A long time program like this yields mounting dividends. The members of the legislature respect the efforts of an organization which keeps at it until the last bell rings. The imagination and sympathy of the general public are stirred into action which, as was said in the beginning, is vigorous, persistent, and effective.

What Social Workers Should Know About Preventable Causes of Blindness*

Eleanor Lee Hearon

SELECTING four of the most common causes of blindness—trachoma, glaucoma, ophthalmia neonatorum, and interstitial keratitis—the author discusses the symptoms and treatment from both the medical and the social service viewpoints

TWO important factors in eye care are skilled service and its accessibility to the patient. Social workers constantly speak of the necessity of utilization of proper resources, which implies not only the knowledge of resources but a discriminating use of them.

Definitions of Ophthalmologist, Optometrist, and Optician

It might be well to define some terms which are confusing to many of us, perhaps because they all begin with the letter, "o." Ophthalmology is the science of the study of the eye. An ophthalmologist is an eye physician who is a graduate medical doctor, who has served his interneship and, in addition, has had at least two years of specialization in the eye, the study of anatomy, physiology, chemistry, pathology of the eye, etc., and experience in the diagnosis and treatment of eye diseases and testing of eyes for glasses. Recently the term "eye physician" has been used and this name itself implies basic medical training and experience, plus specialization in the eye, and is synonymous with the word ophthalmologist. Oculist is synonymous with ophthalmologist, and is of more common usage among lay persons.

* Excerpt of paper given at the National Conference of Social Work, Seattle, Washington, on the program of the Committee on Prevention and Social Treatment of Blindness, June 27, 1938.

An optometrist is a person who grinds lenses, tests the eye for glasses, and sells glasses. An optician is a person who grinds lenses prescribed by the physician, and sells glasses.

The latter two have not had medical training, and hence are not equipped to handle diseases of the eye.

Skilled care, then, means an examination by an ophthalmologist or oculist.

Accessibility of eye physicians is a problem in western states, or in states predominantly rural. In Colorado, for example, there are 63 counties covering an area of 103,658 square miles and there are ophthalmologists in only ten counties comprising an area of 14,296 square miles, that is, 13 per cent of the state has an ophthalmologist available. Each state must work out its own problems of providing adequate eye care, and will probably find, as in Colorado, that ophthalmologists, as individuals, and as members of a state society, are interested in conservation of vision and prevention of blindness and will participate in making eye care of a skilled nature more widely available.

Definition of Blindness

The Social Security Act has done much toward establishing a uniform definition of blindness, and in setting standards for qualified doctors to examine for blind benefits. However, it is important for social workers to have an understanding of the definition of blindness, determination of the degree of vision, and qualifications of ophthalmologists.

Before going on to a discussion of some of the diseases which present potential hazards to vision, it would be well to explain the definition of vision. An accurate measurement of vision is the first step in an eye examination. We are all familiar with vision charts used in schools, by automobile licensing bureaus, and by all doctors for the testing of vision. The most commonly used one is the Snellen chart. This sets up an arbitrary standard for measurement of what the eye sees at a distance of twenty feet. The letters or figures are drawn to scale, so that if a person can read only the large letters at the top it means he can see at twenty feet only what he should be able to see at two hundred feet. This would be written as 20/200. The American Medical Association drew up a standard

classification of vision in terms of per cent of loss of visual efficiency. Their table indicates that 20/200 is equivalent to 20 per cent visual efficiency. But this applies only to things looked at directly and not to the perception of many objects that we can be aware of in other parts of the field of vision.

When a person is unable to read the chart, then there are methods for less precise measurements. The next device that is used in testing the patient is to see if he can count the fingers held before his eyes and at what distance he can distinguish them. Hand motion is then tried—that is, can the patient see the hand which is moved in front of his eyes? Motion helps in perceiving things that are not looked at directly. Light perception and projection come next. Can the patient tell light from darkness; and, if he can distinguish light, can he perceive and point to the direction from which the light is thrown?

In addition to the degree, there is the type of vision, near and distant, which depends on the using of "accommodation of the eye"; and central and peripheral, which depends on direction of the thing seen. For example, in central vision the seeing portion of the eye used is the macula. This particular portion of the retina is used for critical seeing such as is needed in reading, writing, etc. The peripheral vision comes from the outer portions of the retina which allows us to see at the side. This is of great help in orientation, and in observing objects approaching from the sides. It can readily be understood that good peripheral vision is essential for safe automobile driving.

We know too little of what the patient can actually do with the various gradations of vision. Although this depends on the individual patient, yet in general it would be helpful if we knew what could or could not be expected of persons with a certain amount of vision as shown by our tests.

This is not to be a medical discussion, for that is in the province of an eye physician. However, in speaking of some of the diseases which are potential dangers of vision, a brief explanation will be given of the medical conditions which will include something of the tests necessary for diagnosis, the usual type of treatment and possibilities for prevention, as well as the significance of these to the patient and his family.

Some Common Causes of Blindness

For discussion we shall select four eye diseases which are somewhat familiar to the lay person and are common causes of blindness. We shall consider trachoma, glaucoma, ophthalmia neonatorum, and interstitial keratitis.

Trachoma.—Trachoma, "granulated eyelids," is one of the most preventable causes of blindness. Dr. Harry Gradle states that it is utterly inexcusable that any one with trachoma lose his vision. The specific cause is unknown, but the results are well known, and the infectiousness of the condition is understood. The inner lining of the eyelids becomes roughened and furrowed, and this irritates the cornea. On the cornea itself a sheaf of blood vessels appears. They seem to start from above and gradually grow down and cover it like a curtain. When these vessels invade the pupillary area, they obscure vision, and this effect can never be removed. Treatment for trachoma is usually the irrigation of the eyelids, scraping the follicles, or roughened surfaces, applying copper sulphate, and sometimes surgery, to eradicate the roughened areas. Whichever treatment is used, it is very painful to the patient. The copper sulphate, when applied to the reddened and inflamed tender lining of the lids, is a severe treatment. It also requires time, covering months, and in the early stage may be needed daily. The patient, in addition to having an understanding of the condition, and the necessity for care for this type of treatment, must also be taught precautionary measures, personal hygiene, cleanliness, etc. The family can best help the patient if they have an idea of what the patient is going through, and of the precautions for preventing the spread of the disease to other members of the family. We have only to hear that some people living in the Ozarks have been known to infect purposely the eyes of their children in order that when they grow up they will be eligible for blind pensions, to realize the importance of public education. Although the incidence of this disease has been lowered through public health measures, etc., it will only be through vigilance of both the social workers and the doctors and agencies interested in public health and welfare, that trachoma can be eradicated as a cause of blindness.

Glaucoma.—Glaucoma is estimated by Dr. Gradle on the basis of the 1928 census to be the cause of 5.4 per cent of blindness. Dr.

Edward Jackson has stated that it has been the cause of 12 per cent of hopeless blindness. This disease merits careful consideration. Because of the similarity of names, these two diseases, trachoma and glaucoma, are often confused. Glaucoma does not affect the same portion of the eye, but is a disease of the interior structures of the eye. Its cause is unknown. For some reason the small drainage canal of the eye becomes clogged. The fluid in the eye continues to be secreted; and as a result there is an increase in pressure within this area. The effect is similar to that of too much air in a football. As there is no room for expansion there is pressure exerted against the most delicate tissues of the eye—the rods and the cones of the retina—which damages them often beyond repair.

There are, in general, two types of glaucoma, acute and chronic. The acute type is known by extreme pain, and redness of the area just around the iris. Early treatment is most vital and the severity of the symptoms usually results in the patient's going to a doctor. Here again, the question of skilled care is important, for early diagnosis and immediate treatment are vital. The pain sometimes does not seem to be referable to the eye—there may be a severe headache, nausea, etc. Not long ago a patient came into the clinic after hours, moaning and holding her hand to her stomach. A short medical examination did not show any apparent abdominal difficulty and she was advised to return later for a more thorough check-up. The patient refused to go and continued to sit on the bench and groan. She spoke English brokenly and her husband was even more difficult to understand. He was adamant and would only say that he brought the "old lady" to the hospital because she was sick, and wasn't going to take her one hundred and fifty miles home. The patient was referred to Social Service to explain clinic procedure and schedules and to make a return appointment. The social worker learned that the patient was nauseated, and that her head hurt just as it did once a long time before when she lost the sight in one of her eyes. The ophthalmologist found that the patient had a high ocular tension and an acute attack of glaucoma in her one useful eye. She was immediately hospitalized. The ophthalmologists believe that the education of the general medical doctors about glaucoma is important. It is well known that nerv-

ousness, emotional upsets, fright, etc., will affect the pressure of the eye. In some cases emotional upsets have seemed to be the precipitating cause of the attack. Worry can definitely be seen to affect the tension and increase the pressure. A person with this disease should be as free as possible from worry and lead as emotionally calm a life as he can.

The chronic variety of glaucoma is insidious because of the absence of pain, redness of the eye, etc. There is little or nothing on the outside to call attention to the difficulty. There is gradual loss of vision, so gradual that even the patient is unaware of it. Perhaps one day he may cover one eye and be surprised to learn that he cannot see so well out of the other. Patients occasionally give this story.

An eye examination, by an eye physician, will usually detect any tendency to this disease. Since it usually occurs in persons of middle age or over, annual eye examinations for persons in this age group would be a measure of prevention.

If glaucoma is suspected, the amount of pressure is measured by a special instrument and fields of vision are taken. We cannot go into these tests except to say that in each case the patient must co-operate completely if the tests are to be of any value. In the field examinations the necessity of mental concentration means a certain amount of strain and nervous tension for the patient.

There are two kinds of treatment: the use of drops to contract the pupil, and surgery. Both are directed toward lowering the pressure within the eyeball. After a diagnosis is made, treatment may mean constant medication and periodic observations by an ophthalmologist for the rest of the patient's life.

It is the treatment of the chronic type which presents the most serious problem. We often hear the expression, "What we cannot see and do not hear will not hurt us," and this seems to be applicable to our attitude toward patients with this condition. It is difficult for the patient to accept the fact that there is anything very seriously wrong if he has no complaints and no apparent eye trouble, and to feel the need for treatment either by drops or surgery. The drops blur and smart after instillation and may interfere with vision for some time. A common reaction is, "My sight is so much worse than before." Doctors and social workers who deal

with the patient in clinic attempt to explain why this is and to explain to the patient that it will happen. If the social worker who sees these patients can interpret this also to the patient, he may be encouraged to remain under treatment.

Another thing which occurs in glaucoma is that the peripheral vision is contracted or cut down and this, when there is a marked reduction, seriously interferes with the patient's ability to get about. The central vision also is reduced and many patients lose their sense for fine distinction, as vision becomes blurry and foggy.

What do these effects of glaucoma mean in relation to the patient? The nature of the treatment means frequent medical examinations and long drawn out tests, which in turn may take time away from work and mean a cost for transportation, either of which is difficult for him to arrange. The condition itself presents certain limitations or restrictions. Reduction of vision, both central and peripheral, will affect the patient's capacity to get about safely; will influence his employability in certain types of jobs; and, if the vision is much reduced, will affect his working capacity. We are well aware of the social implications for the individual and his family when a wage earner's ability to work is threatened. Disruption of work, loss of income, fear of loss of vision, the prospect of long continued treatment in the attempt to retain the amount of vision he has, with no hope for any improvement, make it difficult for a patient to avoid worry. With the psychological and physiological interplay in this condition the patient seems to be caught in the midst of a vicious circle. He needs the understanding and help of everyone to whom he brings his problems, so that he can face the situation, be able or enabled to accept the responsibility for his own treatment, and modify his manner of life to meet the restriction this disease may impose upon him.

As social workers we are better able to work with individuals with glaucoma, if we too know about the condition and its medical-social implications.

Ophthalmia Neonatorum.—Ophthalmia neonatorum, "babies' sore eyes," characterized by a virulent infection and discharge of quantities of pus, which appears soon after birth, is, in many cases, caused by gonorrheal infection. Unless treated, this condition will usually result in blindness, from the scarring of the cornea; and in

some extreme cases there will be a perforation of the cornea, or the infection may spread into the inner portions of the eye. Immediate examination is indicated and, when diagnosis is established, treatment consisting of irrigation of the eyes and certain medications is initiated. Prompt action is necessary. Prevention of this disease is almost one hundred per cent perfect if silver nitrate or some other preventive is put in babies' eyes at birth. If smear examinations are part of prenatal care and when the organism is present the mother is treated, and if precautions are taken at the time of birth, there is practically no danger of infecting the eyes of the child.

Interstitial Keratitis

Social workers in hospitals are aware of the emotional reactions of mothers when they learn of their children's condition and the cause; of the threat to the marriage of the parents; of the feelings of guilt and, in some cases, the over-protectiveness toward the child, which thwart normal parent-child and family relationships. Dr. Conrad Berens estimates that at least 15 per cent of blindness is the result of syphilis. No part of the eye is exempt from this disease. We shall mention only one of its forms.

Interstitial keratitis, usually a congenital condition, is an inflammation of the cornea which arises years later, from syphilis, and which, if the luetic condition is untreated, may lead to a scarred cornea and blindness. Holloway estimated that 75 per cent of all congenital syphilitics sooner or later show some ocular evidence of syphilis. It is urgent that this group be under medical observation and receive anti-luetic therapy. Routine Wassermanns for all expectant mothers, and treatment when indicated, will practically prevent congenital syphilis, and congenital eye conditions of a syphilitic origin. In addition to the social implications with which we are familiar in syphilis, there are others which are common. It is difficult for patients to see the correlation between the blood condition and the eye condition. When a loss of vision is threatened or occurs we sometimes find marked emotional reactions on the part of parents who consider themselves to blame for the child's condition.

The present outspoken campaign does much in eradicating the stigma and the feeling of shame about this disease, and will result

in individuals being better informed about the disease, and its treatment.

Medical and Social Aspects of Blindness Prevention

The preventable causes of blindness are of both a medical and a social nature. Some can be approached only through social action directed toward eradicating unhygienic living conditions, inadequate food, and other adverse social conditions, improving industrial hygiene, extending public health measures affecting communicable diseases, licensing of doctors, midwives, etc. Others can be approached through meeting the individual and his needs on a case work basis. This entails a knowledge of the patient, his background, family, present situation, his medical condition, which may be a potential hazard to vision: and his attitude toward this and the other social implications of the diagnosis, treatment and prevention of this condition. Social workers, then, should know the various causative factors of preventable blindness, so that they may, both through their treatment of the individual and their leadership in community planning, take part in the basic treatment of the blind—the prevention of blindness.

Bibliography

1. Berens, Dr. Conrad: "What Can An Organization for the Blind Do in Prevention of Blindness?" *Sight-Saving Review*, 3:186–203, September, 1933.
2. Best, Harry: *Blindness and the Blind in the United States.* New York: Macmillan, 1934.
3. Gradle, Dr. Harry: "Prevention of Blindness." *Bulletin* of the Kansas City Southwestern Clinical Society, March, 1936.
4. Holloway, Dr. Thomas B.: "Why Have Ocular Disasters?" *American Health Congress Series*, 4:1–82, May 17–22, 1936.
5. Jackson, Dr. Edward: "Glaucoma," *Hygeia*, 4:523, September, 1926.

Syphilis in Eye Clinics

Robert R. M. McLaughlin, M.D.

FOR maximum efficiency all eye clinics should provide routine Wassermann blood tests for each patient; maintain social service departments; and use uniform methods of recording

A RECENT survey of eye clinics in New York City, undertaken as a part of a study of specialty clinics in regard to the question of syphilis, showed us that syphilis is being inadequately considered in eye clinics generally. This conclusion is based on collected facts provided by the clinic physicians, social workers, and nurses as to the prevalence of syphilis in each clinic; the methods that are used to detect its presence, as well as the means available for the treatment of the disease once its presence is uncovered. When these figures fail to agree with accepted methods and figures collected through all other available means, we feel justified in drawing such a conclusion.

The problem is large and involves such factors as: (1) education of the general public to permit the drawing of blood for the necessary tests as a routine matter; (2) inducing physicians in all fields of medicine, including the specialists, to become "syphilis-minded"; (3) providing adequate and easily accessible treatment in all cases and for all classes of people, regardless of cost.

The amount of syphilis in eye patients has been placed at figures varying from 2.1 per cent to 34.3 per cent, depending a great deal on the locality of the surveys and studies. Routine Wassermann tests on 811 new admissions to the Lighthouse Clinic in New York City during 1937 produced 34, or 4.1 per cent, positives. In the preceding years it was not thought necessary to have a syphilis clinic associated with the eye service because it was believed that there would not be enough patients to warrant it. Needless to say, this clinic is now established and growing.

The amount of eye syphilis seen in syphilis patients is a higher figure. Stokes estimates that between 25 and 35 per cent of persons who have syphilis will show eye lesions in the course of the disease if it is of the acquired type. Of the congenital cases of syphilis, he estimated a 78 per cent incidence at some time before the age of thirty years. He further reported that only 66 per cent of these cases showed a positive blood Wassermann reaction. This fact must be remembered in estimating the incidence of syphilis by means of a routine blood test in any group—sero-negative but clinically active syphilis, detectable by careful history taking, physical examinations, and intelligent social service work.

Routine Blood Test for All Eye Patients

While it is true that a routine blood Wassermann test will not uncover all cases of syphilis, it is likewise true that when a routine test is not performed, many more cases of syphilis remain undiagnosed, especially when the physician does not constantly keep it in mind as a possible cause of the disability presented. Berens and Goldberg reported positive Wassermann reactions in large percentages of certain eye disabilities in their study of 100,000 eye cases in New York City clinics and hospitals. Interstitial keratitis showed 53.8 per cent and kerato-iritis 50.0 per cent positive Wassermann reactions. It is impossible to state in how many more cases the patient was sero-negative, but according to Stokes' figures, these percentages represent only 66 per cent of the actual cases due to syphilis. These are conditions in which it is the duty of the attending physician to first exclude syphilis as an etiological factor before he even considers other causes. There are still other conditions, such as Argyll-Robertson pupil, optic neuritis and papillitis, iritis and iridocyclitis, uveitis and choroiditis, where syphilis must be ruled out as the most likely or else a very probable cause of the trouble.

A routine blood test should be seriously considered by all eye clinics. Preferably, the cost of such a test should be included in the admission charges to the patient. It is often possible to have the test done by the local or state health department without cost to the patient or clinic. After admitting that the dependability of the tests varies widely, that false positive tests will be obtained in

a small percentage of cases, and further that false negatives will be encountered, there is no better method available for diagnostic studies of large groups of persons. The responsibility for failure to provide such service rests squarely on the shoulders of the medical and governing boards of clinics or hospitals offering medical service of any sort to the paying or even the non-paying public.

It is questionable whether routine physical examinations have the value of routine blood tests for syphilis. It cannot be surpassed as a business-making policy in pay or private clinics. In free and city dispensaries, it provides much additional and occasionally unnecessary labor for the clinic physicians—usually overworked. In certain categories of eye conditions, perhaps such a group as mentioned above, routine physical examinations should be performed in addition to a serologic test. If this examination is deferred until a positive blood test is reported, one is satisfied to treat only two-thirds of their syphilis patients. Other contributory or etiologically important systemic diseases than syphilis may be uncovered. It cannot be expected that the eye specialist is capable of doing a satisfactory physical examination, or that he would have the time to do so. This service should be available in the same out-patient department and should be done by competent internists.

Need for Social Service Department in Eye Clinic

Another important and often neglected feature of an eye clinic is a well-trained and adequate social service department. Especially trained social workers for eye patients are desirable in every eye clinic, as the work is peculiar to the field. Either additional training in syphilis work, or an additional trained worker in syphilis, preferably the former, is needed in the vast majority of clinics. Probably the physicians themselves are responsible for the lack of adequate social service workers in many instances. Unfortunately, there has been undue friction in the past, due to the manner in which social service work has been introduced to the physician. Much of the misunderstanding has disappeared as the more exact sphere of action for the social worker has been defined.

One great fault found in eye clinics has been the lack of adequate anti-syphilitic treatment facilities in the same clinic or out-patient

department. Only recently have the larger eye clinics undertaken to supply this service. The development of a moderately active syphilis clinic at the relatively small Lighthouse Clinic (25 patients receiving anti-syphilitic treatment) in the course of one year demonstrates what may be expected. There is no factual basis for the opinion that the eye clinic alone would not supply a sufficient number of syphilis cases to warrant the establishment of such a clinic. Treatment of these cases by referring them to another hospital or clinic usually results in the loss of the patient by the eye clinic or inadequate or no treatment for the syphilis. It is entirely unsatisfactory and is actually impractical to follow up these patients adequately by one or even both clinics.

Finally, it was found that too often there was not a great deal of effective co-operation between clinics in the same out-patient department unless there was a unit record system. It is not possible to conduct all services at the same time of day or on the same days during the week so that personal consultation between physicians regarding each patient common to the involved services can be arranged conveniently. Furthermore, a written opinion provides a permanent record even if not so complete or so exhaustive as a personal consultation.

Summary

For maximum efficiency, all eye clinics should: (1) provide routine Wassermann blood tests for each patient; (2) maintain social service departments; and (3) use uniform method of recording, preferably a unit.

Possibilities for Prevention of Blindness in the Public Assistance Program*

Eleanor Brown Merrill

ONLY with trained and experienced personnel on all fronts—among public assistance workers, prevention of blindness workers, and health officers and nurses—can we look for united action in the campaign against blindness

WE see in the program of the Social Security Board the broad implication of public assistance as it relates to all public and voluntary welfare development. In considering specifically services for the blind, one cannot fail to recognize the significance of these services from the standpoint of prevention, and to be aware of the many avenues into which a program such as has been discussed may lead in accomplishing the final results which all of us desire, namely, the elimination of needless blindness.

Throughout this whole conference there is evident the social worker's concept of a specialized service to the community as dovetailed into the general pattern of a complete and all-embracing program—though calling, as it may, for the employment of special techniques. Just as in case work, we now consider the client as a whole individual and not simply with a view to his particular and separate complaints, so we have progressed to a consideration of the community as a whole, with its various needs, shortcomings, opportunities, and developments, studied in relation one to another. Our goal is a thoroughly integrated, comprehensive community relationship.

Miss Harper brought this point out forcibly on Tuesday, when

* Discussion following "Fitting Special Services into the Public Assistance Pattern," presented by Miss Jane Hoey, Director of Public Assistance, Social Security Board, at the National Conference of Social Work, Seattle, Washington, on the program of the Committee on Prevention and Social Treatment of Blindness, July 1, 1938.

she discussed an integrated program for the blind in relation to public and private activities. In all of the presentations relating to social treatment and prevention of blindness integration has been stressed, with more or less insistence on stimulating in each of the agencies concerned the full assumption of its particular responsibility.

It is inevitable that in working towards the objective of a decreasing need for financial aid, the Social Security Board, through its Division of Public Assistance, must lay emphasis on preventing conditions which lead to disability and dependence. Aid to the blind as administered in many of our states has opportunity to restore sight and conserve vision to an extent that we have, perhaps, been slow to recognize.

In looking through a document recently issued by the Bureau of Public Assistance—"Characteristics of State Plans for Aid to the Blind," December 1, 1937—it is interesting to note certain points and to consider these in relation to the administrative set-up in those 37 states and one territory listed. The definition of blindness used in determining eligibility for assistance agrees in most instances with that recommended by the Social Security Board. A maximum of 20/200 in the better eye after correction is used as the measuring point, with limitation of fields as a qualifying factor; only five have fixed a definite value to the contracted visual fields in determining vision loss. The terminology of these state plans differs, but the majority require examination by a medical practitioner skilled in diseases of the eye, and the value of this provision cannot be overestimated. Though still in the stage of development and experimentation, state plans for assistance to the blind promise much in the way of restored vision for individual cases, determination of causes which will allow for eradication of contributing factors, location and following up of patients who without this service might later be added to the blind population.

A few state plans specify that assistance will be denied or discontinued if the applicant refuses operative treatment which the ophthalmologist certifies will result in partial or entire restoration of eyesight; the applicant may this become ineligible for any form of public relief. There is ground for difference of opinion in regard to such enforcement; the responsibility of insisting upon surgical

measures in view of what must always be an uncertainty as to outcome is greater than many of us would like to assume. On the other hand, we realize that because of inertia, fear, unwillingness to face a possible change in the order of living or for other reasons, many applicants for assistance are averse to sustained medical care and a special prod such as this may secure the desired co-operation. It seems wise for each case to be considered on its individual merit and the department's discretion used in deciding whether or not to withhold aid on this basis.

An added argument, is it not, for good case work services? Without an understanding of the client's attitude, of the conflicts and possible sense of failure which have contributed to a complex situation; without realizing the natural fears of surgery and its results, the public assistance worker would be very limited in her resourcefulness.

I was interested, in talking recently with the medical social worker on a city welfare department staff dealing with blind assistance, to learn of the plan she had adopted in regard to applicants recommended for cataract operation. Whenever an investigator finds such applicant resistant to the idea, she advises him to come to the general office and talk with the medical social worker, who then discusses the matter from her own knowledge and experience, clarifying the patient's mind as to the reason for such recommendation, the factors involved, and the probable beneficial result. If the patient with this fuller understanding is then willing to reconsider, he is referred back to the doctor or hospital with word to that effect and has another and fairer opportunity to decide what his action shall be. For interpretative service such as this, however, special preparation is needed, since the medical social worker must thoroughly understand the diagnosis and the various factors involved. Not handling case work herself, she must none the less be versed in its processes and techniques, and must be able to correctly steer her clients to the proper sources. Hers may be the function largely of technical consultant—to client, to division staff, to family and relief workers, to the department in helping to determine policies, to the community in interpreting public health and welfare needs.

Let me be more specific as to the kind of problems that come

to the attention of a medical social eye worker in a public assistance division. A family of eight is under consideration, with the forty-four-year-old mother and four children certified as blind from a congenital condition; two of the other three children have impaired vision. Can something be done to improve the vision of these two children, or at least to prevent further impairment, and can the normally sighted child be safeguarded against damage? Will intelligent, understanding guidance prevent further incidence of blindness in the family?

A man certified as blind from trachoma can be given sight (20/50 in one eye, 20/40 in the other) with the use of contact lenses, though only for two hours a day, as the eyes could not stand more continuous correction. Can the lenses be provided as a help to this man's morale, yet with the realization that two sighted hours a day cannot remove him from the need of blind assistance? What about the sixty-three-year-old man with lowered vision? The doctor says glasses can prevent future blindness, but as he is not now eligible for relief, either economically or because of his eye condition, who will interpret the situation to his family and secure their necessary co-operation?

A statement made in March, 1938, by Dr. C. E. Rice, Consultant on Blindness to the Social Security Board, gave the amount of $1,100,000 a month as being paid to 43,700 needy blind persons in 36 states and territories. No guess can be made as to how far these figures may be reduced through restorative measures, but the next few years may show some interesting data. According to the National Society's latest count, 31 states, Hawaii, and the District of Columbia have either supervising ophthalmologists, medical advisory committees, or both, taking part in blind assistance and helping to plan the division's program. Is not this encouraging to all of us interested in sight conservation?

We have recently been in rather close touch with developments in several states where, until the creation of a blind assistance program, no general movement to prevent blindness had been undertaken. I should like here to mention what is happening in two or three instances.

A State Department of Public Assistance, enabled by provisions under the Public Welfare Law to carry a program for adult physical

rehabilitation, secured appointment by the State Medical Association of an advisory and a special technical committee to pass on applications from physicians skilled in diseases of the eye. Doctors accepted are classified into three groups as qualified for major surgery, slight surgery and treatment, or refraction only. In these three classifications the physicians (numbering 49 at present and located in 23 counties of the state) are qualified for restorative and preventive work. Applicants for blind aid are referred by their county department of public assistance to the nearest acceptable eye physician for examination—the expense of such and of transportation to be paid by the county department. A fee schedule has been established for hospitalization, clinic and office visits and for surgical treatment in relation to the seriousness of the operation, and physicians are paid according to services rendered. Examination fees are paid when no operation is called for; otherwise they are included in the operative fee as scheduled. In addition, funds are made available for refraction, glasses, and such laboratory and other tests as may be indicated. A supervising ophthalmologist is studying the findings, and the standard form of eye record and cause classification, as recommended by the Committee on Statistics of the Blind, is in use.

Similar procedures are, we know, in effect elsewhere. I have given one example as typifying a method through which eye conditions amenable to treatment will be adequately diagnosed and treated; and through which accurate data are being accumulated to furnish the basis for preventive activities.

In one state a newly formed welfare department is engaged through its division of public assistance in securing adequate examinations and follow-up care for its blind applicants. A division for the blind, established under the same department, appointed a medical social worker whose duty, after a four-months' period of special training, is to initiate and develop a prevention of blindness program. With the close proximity of these two divisions, the medical social eye worker can serve in a consultant capacity for the blind assistance staff and assume direct responsibility for those applicants ineligible for assistance yet potentially blind unless proper attention can be assured.

As prevention of blindness worker and with the counsel of an

ophthalmological advisory committee, she is at the same time laying the groundwork for a long-time program that will, it is thought, secure the support and co-operation of the various related agencies and of the public. Data on the incidence of ophthalmia neonatorum are available to her from the State Department of Health; she will follow up these cases, not only with a view to making sure of all possible precautions, but in order also to secure full information to serve as a talking point in obtaining more effective legislation than at present exists. Further lines of co-operation between the preventive program in this state and the public health program are through the organization of eye health examinations in rural clinics, and the development of a procedure whereby county health officials will report the names of children found in school examinations as having visual acuity of 20/70 or less. This latter plan is with a view to bringing about the establishment of sight-saving classes as needed. The medical social worker is following up other opportunities through conferences with school officials, participation in the state college summer sessions and in the school of social work curriculum, and through talks before various civic and volunteer groups. Through her, arrangement has been made with the School for the Blind whereby corrective care is being provided for 18 pupils, several of whom are expected to enter regular grammar school next fall.

So new an undertaking as the one just mentioned can but suggest a few of the activities which must be included in a state prevention program. I am glad to say that some state agencies for the blind and societies for the prevention of blindness have gone much, much further than this in their endeavors, and there are many who can tell of splendid developments and accomplishments over the years. Again I have cited one example of what may come into a state—until now apparently unaware of the lack of its health and welfare provisions—through the stimulus of an assistance program and the focusing of attention on a problem which, to some extent at least, is possible of solution.

But I shall return to a point brought out in the early part of my discussion, and that is the necessity for qualified personnel if sound foundations are to be laid and a clear course followed to the desired goal. Without knowing the significance of eye diagnoses, their pos-

sible complications and effect upon an individual, how can the public assistance worker meet her responsibility in bringing about a proper acceptance and follow-through of the recommendations made? Without a case work philosophy, how can the prevention of blindness worker bring to her program that individualized yet broad concept that will result in the building of independence, rather than in the breaking down of morale; or without a comprehension of agency relationships, how can she guide the community to full participation in an integrated program? How can the schools, the health officers and nurses, the social workers, take their part in saving sight without a realization of those factors which must contribute to the possession of good eye health?

To quote Miss Hoey at the National Conference of Social Work in Indianapolis: "We must see that adequate service as well as assistance is given, and this can be done only when trained and experienced personnel are employed by both state and local agencies." With trained and experienced personnel on all fronts, we may look for united action that will get us far in our campaign to prevent blindness.

Pictorial Preview

"The Nurse's Responsibility in Saving Sight"—A New Talking Slide Film

RECOGNIZING that every nurse has countless opportunities to help conserve eyesight—in hospital, home, school, and industry—the National Society for the Prevention of Blindness presents a talking slide film entitled "The Nurse's Responsibility in Saving Sight." Emphasis is placed throughout upon the close integration of the eye health program with the general health activities common to all fields of nursing. The health of the eye is presented from prenatal life to old age.

As an educational device the talking slide film* has many advantages. "The Nurse's Responsibility in Saving Sight" consists of 120 still pictures on a film strip synchronized with a double-faced record carrying a lecture addressed to nurses. As the film strip and record are completely separate, they may be interrupted at any point to permit discussion—thus giving the advantages of a series of slides with the addition of a lecture in the form of a phonographic narrative. Running time is 30 minutes.

Approved by a committee of ophthalmologists, nurses, and staff members of the Society, the complete production—film and record—can be purchased from the National Society for the Prevention of Blindness at $5.00, plus transportation. It is also available for rent at $2.25 per week, plus transportation costs.

* The talking slide film requires a talking slide film projector, of which there are several makes. In many localities, projectors may be borrowed from automobile dealers or other business firms if purchase is not feasible. The talking slide film is not a moving picture and cannot be shown on a motion picture projector. Further information may be secured from the National Society for the Prevention of Blindness, Inc., 50 West 50th Street, New York, N. Y.

"Since many of the causes of blindness have their origins long before birth, early and adequate prenatal care is our goal for every prospective mother."

"The silver solution must get into the eye *immediately* after birth; the lids must be properly retracted so that the prophylactic agent gets *under* the lids and bathes the cornea and conjunctiva; and lastly, it must remain in the eye long enough to be effective."

"Careful preparation for the vision test is necessary. The location for the chart should be selected so that the chart will be free from *glare* and *shadows*. To be accurate, the distance at which the test is made should be *exactly twenty feet*."

"Changes in the normal field of vision are so characteristic of various conditions that a study of visual fields by means of the perimeter is an important step in diagnosis."

Editorials

. . . Each for the joy of the working, and each in his separate star . . .
—Kipling

George Edmund de Schweinitz, 1858–1938

THERE are certain persons who are irreplaceable in the activities with which they are associated. Such a man was George Edmund de Schweinitz.

For the part that he was destined to play in life he was singularly gifted. He was tall, slightly built, with light hair and clear blue eyes, kindly but penetrating; when he spoke his face lighted up as if illuminated by an inner flame, and his voice, which never needed to be raised in order that it might carry to the farthest hearer, had a peculiarly agreeable quality. His poise and his personality made him an outstanding figure in any group of men.

Dr. de Schweinitz derived from a most distinguished ancestry. His father, a bishop in the Moravian Church and president of the Theological Seminary and College at Bethlehem, Pa., was a great-great-grandson of Count Zinzendorf, upon whose estates was founded the Moravian Community in Saxony in the sixteenth century.

Dr. de Schweinitz's thorough medical training, based upon a wide general cultural foundation, opened for him wide fields of usefulness which he adequately covered. He received his training in letters, naturally, in the Moravian College, whence came his bachelor and master degrees. Later, in 1881, his scholarship was further recognized on his receiving the degree of Doctor of Laws and, in 1914, that of Doctor of Humanities from his alma mater. The University of Michigan in 1922 honored him by making him a Doctor of Science, as did Harvard in 1927.

His life was an abundant one. He was professor of ophthalmology in the Philadelphia Graduate School of Medicine from 1902 to 1924, during which time he was also consulting ophthalmologist to the Philadelphia Hospital. He was a major in the National

Reserve Corps, and saw active service in France from 1917 to 1919 as lieutenant colonel in the Medical Corps of the United States Army, and was an officer in charge and consultant in ophthalmology to the office of the Surgeon-General. At the time of his death he held the rank of brigadier general in the Auxiliary Medical Reserve.

His contributions to medicine were varied and important. He was a member of the Board of Medicine and Surgery for the history of the war. His work, *Diseases of the Eye*, was one of the most popular in all American medical schools. In a few years it passed through ten editions. He was one of the authors, with Dr. Randall, of an extensive work, *Diseases of the Eye, Ear, Nose, and Throat*, and was an author of the standard work on *Toxic Amblyopias* (The Alvarenga Prize Essay). He was the American editor of Haab's *Ophthalmoscopy and External Diseases of the Eye and Operative Ophthalmology*, and co-author with Dr. Holloway on *Pulsating Exophthalmos*. He edited, with Dr. Jackson, the *Ophthalmic Year Book*, from 1905 to 1909. His writings included numerous articles and monographs on ophthalmological and neurological subjects. In 1923 he was invited to give the Bowman lecture in London, a distinction which goes only to the most eminent ophthalmologists in the world.

Dr. de Schweinitz was president in 1922 and 1923 of the American Medical Association, a member of the American Philosophical Society, of the Academy of Natural Sciences, of the Ophthalmological Society of the United Kingdom, of the *Société Française d'Ophtalmologie* and the *Société Belge d'Ophtalmologie*. He had been president of the College of Physicians in Philadelphia; honorary fellow of the New York Academy of Medicine; honorary member of the Royal Society of Medicine in London (Section of Ophthalmology) and of the Hungarian and Egyptian Ophthalmological Societies. He was awarded a plaque by the *Société Française d'Ophtalmologie* in 1924, the Howe prize in ophthalmology in 1927, and the Huguenot Cross in 1928.

His association with our own Society was most helpful. He was appointed a member of the Advisory Committee in April, 1926. A note made in the records of the then National Committee for the Prevention of Blindness says:

"In recognition of the eminent service which Dr. George Edmund de Schweinitz has rendered to this Committee, and with the hope that this service may be continued and his hearty co-operation secured, Dr. de Schweinitz was unanimously invited to become an advisory member of this Committee."

He was elected honorary vice-president of the Society in June, 1935.

In appreciation of his great service for the prevention of blindness he was presented in 1930 with the Leslie Dana Gold Medal, on which was the inscription: "Dana Medal for the Prevention of Blindness Awarded to George Edmund de Schweinitz, M.D., Wise —Learned—Patriotic—Teacher and Guide."

In the death of Dr. de Schweinitz, ophthalmology loses one of its great leaders, and the National Society for the Prevention of Blindness one of its most helpful advisers. We extend to his relatives and friends our sincere sympathy in the loss which all of us have sustained.

—PARK LEWIS, M.D.

John M. Wheeler, 1879–1938

The untimely and unexpected death of Dr. John M. Wheeler has removed from the Society's Board of Directors one of its most distinguished and useful members. It seems fitting that we should make appropriate expression of our sorrow and our loss in THE SIGHT-SAVING REVIEW.

We cannot make more than a very brief review of his life and his career, and of his interest in and his service to this Society.

He was born in Burlington, Vt., a typical New England college town, on November 10, 1879, and was educated in the city public schools. He received his A.B. and M.D. degrees at the University of Vermont, of which his father was both an alumnus and its long-time treasurer. It was a small state university with little endowment and less material equipment, but it had on both the academic and the medical faculties a few men who had the double gift of teaching and inspiring. He served an internship at the New York Eye and Ear Infirmary, the story being that his first application

was rejected because there were candidates who had more assurance or came from institutions that were better known. As an intern, he was the perfect assistant—no labor was too great; no detail, too small. He went to the foundation of things and was not only intelligent and of sound judgment, but he had, beyond most, the steadiness of hand and the delicacy of touch that eye surgery requires. Furthermore, he had the temperament of the great surgeon, the willingness to assume responsibility and, when he had done his best, the ability to banish worry.

Dr. Wheeler was popular with all his surgical superiors. When he finished his internship he went into the office of one of them and eventually inherited a practice which had been continuous since the beginning of ophthalmology as a specialty.

He became an assistant in the hospital clinic of another physician, eventually succeeding him as full surgeon and, later on, as professor of ophthalmology at Bellevue Medical College. As the older men retired, Dr. Wheeler's reputation grew, not because he was pushing and aggressive, but because of his universally conceded ability.

When Columbia University brought about the creation of the Medical Center with the Presbyterian Hospital as the nucleus, he was chosen to develop the new Institute of Ophthalmology. It was for all practical purposes built around him. He was entirely responsible for the selection of his subordinates and, with them, spent months of meticulous study of the requirements and design of the perfect eye hospital. He had the unique ability of inspiring subordinates with complete confidence in his knowledge and surgical skill, and also of building up an *esprit de corps* among them; of assigning to each the task appropriate to his ability; of encouraging them to do original work—often work that he had hoped to do himself if he could ever find the time. No man has ever more enjoyed the affection of his associates and subordinates.

He was a very great eye surgeon, for he not only did superlatively the operations that his predecessors had devised, but he originated numberless new ones or improvements on the old. In the World War he was assigned the care of the mass of unfortunates who were crippled and disfigured by war wounds and hasty war surgery.

He developed out of this supposedly hopeless task a marvelous

technique of plastic surgery which seemed likely to put him among the ophthalmological immortals. As he grew older this reputation increased, and more and more of the desperate cases were referred to him for a final judgment, where the chances of failure even at his hands were often far greater than the chances of success.

He was an ideal consultant—always helpful and understanding, willing to assume responsibility, and rarely critical. His thoughtfulness and kindness for his patients, whether rich or poor, were proverbial.

A few years before his death he lost one of his own eyes from a malignant growth—a misfortune which would ordinarily have terminated his surgical career. With steadfast courage he forced himself to forget the possibilities of recurrence and convinced himself that he could still operate up to his own high standards and kept up his work, both executive and surgical, so that his last years were in many respects his greatest ones.

He was deeply interested in various phases of prevention of blindness, and in May, 1931, was elected a director of this Society. He was always ready to give advice on our problems, to which he brought his characteristic independence of thought. For instance, he did not believe that myopia was always the serious disease that most social workers are trained to believe.

He was a hearty supporter of our medical social eye service program and lent his aid to our sight-saving class training course when it was given at Columbia University. One of the last things he did was to prepare a letter calling the attention of his colleagues to our work, and suggesting ways in which they could be of help. This was to have been sent out over his own signature. Professional honors and degrees came to Dr. Wheeler increasingly year after year. In 1936 he was awarded the Leslie Dana Gold Medal, fittingly inscribed: "Skilled Surgeon, Great Teacher, Understanding and Sympathetic Physician and Friend."

—Ellice M. Alger, M.D.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

Concerning the Reported Increase of Ophthalmia Neonatorum Among Pupils Now Entering Blind Schools

I suspect the increase in the percentage of ophthalmia neonatorum in blind school admissions from 6.7 per cent in 1933 to 9.1 per cent in 1937, noted in Dr. Jost's article in the June, 1938, SIGHT-SAVING REVIEW, page 83, may be due to the fact that a large number of partially-seeing pupils did not enter schools for the blind in 1937, whereas a goodly number of pupils who should have been in sight-saving classes really entered Braille schools in 1933. Braille classes contain many more pupils who have had ophthalmia neonatorum than do sight-saving classes. Indeed, the ratio in my survey of the first 134 pupils in the Chicago Braille and sight-saving classes in 1928* showed only one case of ophthalmia neonatorum in the sight-saving group and ten cases of ophthalmia neonatorum in the Braille group.

It is readily to be seen that if a large number of pupils who have not had ophthalmia neonatorum were removed from the Braille classes, the proportion of those left in the Braille classes who had had ophthalmia neonatorum would be increased.

I think this accounts for the apparent increase of ophthalmia neonatorum among the children who are now entering schools for the blind and that the increase is apparent and not real.

E. V. L. BROWN, M.D.
Chicago, Ill.

Editor's Note.—REVIEW readers will, no doubt, be interested to learn that since the publication of Dr. Jost's article alluded to above, once again in the school year 1936–1937, the proportion of new pupils with blindness caused by ophthalmia neonatorum dropped to 6.7 per cent.

* "Sight-Saving Class Work from the Standpoint of the Ophthalmologist," *American Journal of Ophthalmology*, Vol. II, No. 2, February, 1928.

Note and Comment

Legibility Requirements for Schoolbooks.—The general consensus of experimenters in the legibility of textbook types is that 24-point type is the most legible for first-graders; 24-point and 18-point type for second graders; and 18-point type for pupils up to the fifth grade. It has been found, however, that 12-point type is satisfactory even for first and second grade texts when 4-point leading is used.

Covers in color appeal to children, who prefer blue and red and dislike black. For the actual printing, however, the most legible combination is black ink on white paper.

Illustrations, especially in color, unquestionably add to the attractiveness of the books. Children in primary grades tend to favor books containing bold central groups, with few but striking and well-selected details. They enjoy humor and action or other emotional qualities that tell a story. Older children also like pictures containing humor and action. In addition, they are interested in imaginative figures, landscapes, and wild animals. The decorative type of illustration does not meet with favor among children of any age group.

These factors apply, of course, only to children of normal vision and do not take into account the special problems of sight-saving class pupils.

Progress in Denmark.—No "gloomy Dane" is Dr. Gordon Norrie, of Copenhagen, who has recently retired after 35 years of service as surgeon to the Royal Institute for the Blind. He can look back on a record marked with splendid achievement. From 1886 to 1900 he fought hard for the introduction of Credé's method, and finally succeeded in inducing the Royal Board of Health to order midwives to use a 1:150 solution of silver nitrate at every birth. Results became speedily evident. Forty-two of the blind children born between 1892 and 1906 were blind from ophthalmia neonatorum; in the past 15 years, however, there have been only five cases and not one case has occurred for the past four years.

There is no blindness from smallpox in Denmark, for vaccination has been compulsory since 1810; nor is there any blindness from trachoma.

Royal Eye Hospital Combats Eye Hazards.—A dismaying increase in industrial eye accident cases from 6,500 in 1935 to 7,400 in 1936 and 7,700 in 1937 has led the Royal Eye Hospital in London to open a permanent museum for the instruction of workmen who are treated for eye injuries. The purpose of the exhibition is to encourage the wider use of goggles, veils, guards for grinding machines, and other safeguards in occupations involving risk to the eyes. The hospital has formed an industrial eye committee to further this object by making employers conscious of the necessity for safety measures and combating prejudice or negligence among the workmen whom the appliances are intended to protect. In the exhibition are shown different types of goggles for such occupations as grinding, welding and riveting; and metal-spattered goggles, glare and dust proof, which are used by air pilots. These spattered glasses are partly mirrors, partly transparent, so that harmful rays are reflected without cutting off the wearer's view. A grim exhibit consists of eyes removed with splinters still in them—fifty cases occur annually at the hospital.

Mr. Joseph Minton, surgeon to the hospital, estimates that throughout Great Britain 250,000 eyes are injured every year through industrial causes, with resulting blindness or serious damage to sight in numerous cases. Approximately 85 per cent of these accidents are preventable.

Research on Effects of Glare.—An experiment is being conducted at the National Physical Laboratory in England to show the effects of glare in an artificially lighted street. Observers are asked to detect models of a man or dog introduced into a film projected under conditions simulating those existing in typical lighted streets. The varying degrees of glare are indicated by the time taken by various observers to detect these models.

Pioneer Rural School Installs Modern Lighting.—For 80 years pupils at the Eola school in Oregon learned their three R's under

inadequate, uncontrolled illumination. In 1937, however, a new building was erected and equipped with automatically controlled artificial illumination.

At Eola school the photronic tube is mounted on the inside wall over the blackboard. Here, in a standard 24- by 36-foot classroom, the "electric eye" maintains a constant vigil over light upon the pupils' desk-tops. Artificial lighting for the school is provided by six modern indirect luminaires. They provide the pupils with glareless, even illumination relatively free from shadows. Three of these units are automatically turned on and off by the photronic tube working through the relay switches.

Noise Impairs Vision.—Dr. Charles A. Elsberg, of the Neurological Institute at Medical Center, New York City, has made researches in hearing and vision which indicate that a person needs more light in order to see an object after hearing a loud noise than he did before such stimulation to hearing.

Applying this finding to highway accidents, Dr. Elsberg says that if a person "is using his vision up to the limit of its capacity, and a truck with a muffler cut-off is passing him, the loud noise will influence his vision, which is already taxed to the fullest degree. As a result, he may not be able to judge distances as well and, in an emergency, he may have an accident."

Visual Standards for Drivers.—Recognizing the need for greater care in the operation of motor vehicles on the highways, the House of Delegates of the American Medical Association at the recent San Francisco meeting adopted the following resolution. The standards set forth were developed by the Section on Ophthalmology, where this program had been under consideration for many years:

Resolved, That the following be accepted as the approved American Medical Association standards:

A. For an Unlimited License
   1. Visual acuity with or without glasses at 20/40 Snellen in one eye and 20/100 Snellen in the other.
   2. A form field of not less than 45 degrees in all meridians from the point of fixation.
   3. The presence of binocular single vision.

4. Ability to distinguish red, green, and yellow.
5. Night blindness not to be present.
6. Glasses when required be worn while driving and those employed in public transportation be provided with an extra pair.

B. Visual Standards for Limited License
1. Visual acuity of not less than 20/65 Snellen in the better eye.
2. Field vision of not less than 60 degrees horizontally and 50 degrees vertically from point of fixation in one eye.
3. Diplopia not to be present.
4. Glasses to be worn when prescribed.
5. Co-ordination of eye, mind and muscle to be fully adequate to meet the practical visual road tests.
6. A limited license not to be issued to those employed in public transportation.

C. Renewals, Retesting, and Re-examinations
1. Renewals of license to be issued at least every third year. The applicant shall with each renewal make a declaration that he knows of no visual defect which has developed during the past year.
2. Retesting of acuity to be made at least every six years.
3. If any visual defects have developed, an examination by an ophthalmologist and the report thereof, to be required before reissuing the license.
4. License to state thereon the specific limitation for driving.

Palestine Makes Sight-Saving Advances.—Despite unsettled conditions in Palestine, the Ophthalmic Hospital of St. John of Jerusalem made remarkable progress in 1937, treating the largest number of new out-patients on record, with a total of 109,523 patients. Among Jewish patients there was a marked increase in both number and percentage. Trachoma, one of the great scourges of this country, accounted for 85.82 per cent of the cases; although this figure seems shockingly high, it is the lowest ever recorded at the hospital. Some improvement was noted in the "blindness rate" in spite of a severe but localized outbreak of acute conjunctivitis affecting the townspeople. Potent factors in this outbreak were malnutrition, debilitation caused by measles and whooping-cough, and the widespread economic distress caused by unemployment.

Universities Continue Eye Course.—Teachers, nurses, social workers, and those in allied fields will be interested in the "Survey of Eye Conditions" course to be given this year at New York University School of Education and Teachers College, Columbia University. The course is presented by ophthalmologists and technicians and presents a comprehensive study of the physiology and pathology of the eye and methods of treatment. It is offered in evening sessions at both universities. For detailed information address inquiries to the Office of the Secretary, Teachers College, Columbia University, 525 West 120th Street, New York City; Professor Helen C. Manzer, School of Education, New York University, Washington Square, New York City, or Miss Ruth B. McCoy, Director, Prevention of Blindness Service, New York State Department of Social Welfare, 205 East 42nd Street, New York City.

Eskimos to Receive Eye Tests.—In a region where "night" prevails for six months, the problem of night blindness may be a cause for much concern. In order to relieve Eskimos who suffer from this defect, Dr. Howard H. Conn, of Johns Hopkins University, recently left for the eastern Arctic, where he will make eye examinations of the Eskimos and seek to effect a cure by proper treatment.

British Industrial Eye Injuries.—Of 192,539 non-fatal accidents reported in the *Annual Report* of the chief inspector of factories and workshops for the year 1937, 8,889 were eye injuries sufficiently serious to disable the victim for more than three days.

The industries reporting the largest number of such injuries are as follows: metal industries, 2,205; machinery, 1,779; engineering, 1,299; shipbuilding, 571; docks, buildings, and warehouses, 404; textile industries, 271; light metal trades, 252; chemical industries, 250; clay, stone, lime, and cement industries, 221; woodwork, 173; pottery and glass industries, 101.

German Definition of Blindness.—The National League for Industrial Employment of the Blind in Berlin has established, with governmental approval, certain practical definitions of blindness, designed to facilitate classification of virtually blind persons. In addition to the totally blind, all persons are considered as blind

whose central visual acuity amounts to from one fiftieth to one twenty-fifth of normal. Practical blindness may also be considered present even if the visual acuity is greater than one twenty-fifth of normal, in special cases, as, for example, if a depreciated acuity of vision is accompanied by considerable diminution of the visual field. The latter class is composed chiefly of patients who present certain disorders: optic atrophy, glaucoma, pigmental degeneration, retinal detachment, hemianopia. Further particular conditions in which blindness may be assumed are nystagmus with phantom movements of external objects perceived, nyctalopia following pathologic changes of the inner eye, and, finally, cases in which a full practical evaluation of central visual acuity is qualified by the advanced age of the patient.

Unusual Cause of Myopia.—Temporary myopia may occur in normally seeing children when they are confronted with a strange handwriting, a new problem, or a phrase in a foreign language, according to a Nova Scotian physician, who states that this phenomenon may be proved by observation under the retinoscope.

"Ticker Tape" Records Eye Movements.—Development of a new "ticker tape" method of recording eye movements while the eyelids are closed was reported by Dr. Ward C. Halstead, a member of the staff of the Otho S. A. Sprague Memorial Institute in the Division of Psychiatry of the University of Chicago clinics. The eye, Dr. Halstead explained, acts like a miniature storage battery with a strength equal to 1/1,000,000 that of a battery used in an automobile. Every time the eye moves there is a fluctuation of current which is detectable by the new device. The amplifier manipulates a recording pen on waxed ticker tape paper, making a graph of the eye movement.

In an article in the *Journal of Psychology* Dr. Halstead reported that it is possible to secure reliable records of the direction and extent of eye movements while the subject is walking around a room. This flexibility is important in mental cases and is something not possible with other methods of recording eye movements.

The interesting possibility of recording eye movements while the subject is asleep is still to be explored.

Eye Shadow Used to Banish Glare.—When the seductive Cleopatra adorned her eyelids with green malachite, she not only enhanced her beauty, but also afforded her eyes some protection from the intense glare of the Egyptian sun.

Plastic Lenses.—Optical glass, such as is used for spectacles, transmits about 83 per cent of the light, as compared with a new lens of unbreakable plastic material, which transmits 95 per cent. This plastic lens, which has been tested in the goggles of football players, weighs about half as much as the same amount of glass. It is resistant to alkalis and to acids, except the strongly oxidizing types. Heat below 158 degrees Fahrenheit does not soften it nor is it damaged or discolored by sunlight. It may be colored with basic pigments and is soluble in esters, ketones, and coal-tar hydrocarbons.

Harvard Law Library is Light-Conditioned.—Harvard Law School students will find their reading of musty legal volumes much less of a strain now that the Langdell Hall reading room has been light-conditioned. This reading room, the largest in the country, now has a general illumination of a cool daylight quality, achieved by specially designed lighting units which balance the excess yellow-red of incandescent light with the blue-green output of mercury-vapor tubes.

In use, the daylight quality of the lighting has come to be particularly appreciated in the late afternoons when a certain amount of natural daylight still enters the room from the two-story windows. There is no noticeable contrast between the natural and artificial light sources, and no disturbing quality change as artificial lighting is turned on.

Current Articles of Interest

Industrial Eye Injuries, Joseph Minton, F.R.C.S., *Industrial Welfare and Personnel Management,* July, 1938, published monthly by the Industrial Welfare Society, Inc., London, England. The author is a surgeon at the Royal Eye Hospital, in London, which treats 50 to 60 cases of eye injuries daily. About 80 per cent of the patients come from the engineering and metal trades and the remaining 20 per cent come from building trades, chemical factories, coke making, loading and transport, paper factories, and printing works.

The commonest type of injury is foreign body in the cornea. Fortunately safety education has been so widespread that workmen usually go to the hospital for treatment rather than rely on their co-workers' attempts with penknives and toothpicks. Chemical burns of the eye, also numerous, are treated by a thorough irrigation with a saline solution, and followed by daily inspection of the eye. Electric welding conjunctivitis, a condition comparable to severe sunburn of the eye, is treated by the instillation of liquid paraffin or castor oil into the conjunctival sac.

The author attributes the high incidence of industrial eye injuries to the lack of provision of safety measures by many employers and to the complete negligence by many workmen in using the safety measures when they are provided. An important step in safety education is being taken by the Royal Hospital in its recent establishment of a museum devoted to the various causes of eye accidents.

Some Problems Encountered in Cataract Surgery, Watson W. Gailey, M.D., *American Journal of Ophthalmology,* August, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. The author stresses the importance of preliminary examination of the patient before operating for cataract. Any suggestion of uncompensated cardiac disease, chronic bronchitis, bronchiectasis, asthma, hypertrophy of the prostate, hemorrhoids, chronic constipation, high blood pressure, infected teeth, or dia-

betes should be thoroughly investigated and every effort made to rectify such conditions before the ocular operation is attempted.

The period in the development of a senile cataract when extraction is most advisable cannot be determined without consideration of the age, visual acuity, physical status, prejudices, and occupation of the patient. Perhaps the wisest standard to adopt is the patient's unhappiness at his inability to continue with his work; he is then ready to accept surgery.

For post-operative treatment, also, no generalizations may be made, as the peculiar aspects of each individual case must be considered. The author sets the tenth day as an arbitrary time for cataract patients to go home, but he prefers in all cases to wait until the eye is white. The eye should generally be covered and dressings continued for about two weeks, and the Fox aluminum shield should be worn at night for an additional week.

Highlights of the History of Ophthalmology, William Thornwall Davis, M.D., *Southern Medical Journal*, June, 1938, published monthly by the Southern Medical Association, Birmingham, Ala. The earliest written record of ophthalmology occurs in the Code of Hammurabi, 2250 B. C., a collection of Babylonian laws. Records have also been discovered in Egyptian papyri indicating that trachoma was even in early times a terrible scourge in the land of Egypt. The growing decadence of Egyptian medicine may be noted in the fact that the later manuscripts reveal more and more of superstition and the practice of magic in their therapeutic prescriptions.

Greek medicine marks numerous advances, particularly in the work of Hippocrates, who recognized the ophthalmias, pterygium, chalazion, ectropion, trichiasis, ulcers and scars of the cornea, nystagmus, and photophobia, and whose treatment of trachoma has not been materially improved upon by modern medical practice.

The early centuries of the Christian era were characterized by the beginnings of medical specialization, especially in the field of ophthalmology. The Arabians made particularly valuable contributions.

The chief contributions of the Middle Ages were the suggestion of the versatile Friar Bacon that lenses be used to correct vision

and the discovery by Leonardo da Vinci that the retina and not the crystalline lens is the organ of vision.

Beginning with George Bartisch, the father of modern ophthalmology, progress in ophthalmology has grown apace and is marked by advances in the fields of both medicine and physiological optics, the establishment of special eye hospitals and ophthalmological societies, and the publication of books and treatises on the physiology and the pathology of the eye.

The author expresses the opinion that advances in America, particularly since the World War, when European medical centers were impaired in their efficiency, have been so promising that America may now be said to lead the world in ophthalmology.

Injuries and Infections of the Eye, Arnold Sorsby, F.R.C.S., *The British Medical Journal*, April 23, 1938, published weekly by the British Medical Association, London, England. The author lists those types of eye diseases and eye injuries which may be safely treated by the general practitioner who is equipped with a minimum of specialized eye training, including the removal of foreign bodies which are not too deeply imbedded and the treatment of such common eye troubles as styes.

The Treatment of Infected Abrasions of the Cornea, Charles F. Kutscher, M.D., *The Pennsylvania Medical Journal*, August, 1938, published monthly by the Medical Society of the State of Pennsylvania, Harrisburg, Pa. The use of sodium hypochlorite in a solution of 1 to 5000 has been found highly effective in controlling corneal infection. This chemical is also successful in diminishing pain and, since it attracts only dead tissue, there is no increase in the amount of scar. The significance of this contribution to the treatment of corneal infections and ulcers is of greatest importance to physicians treating industrial eye injuries.

The Management of Heterophoria, Charles R. Hartsook, M.D., *Texas State Journal of Medicine*, August, 1938, published monthly by the State Medical Association of Texas, Fort Worth, Texas. In order to determine the presence of muscular imbalance the author makes a routine practice of testing for esophoria, exophoria, and

hyperphoria, at 20 feet and at 13 inches, using the cover and parallax tests. When an imbalance of consequence is found a complete examination of muscular functions is made. Treatment by base-in prisms is indicated only in exceptional cases and as a rule should be given only when all other measures have failed and surgery is not practical. Orthoptic training is usually the most satisfactory method of treatment. When surgery is undertaken the power of the abnormal muscle should be adjusted; hence in divergence excess a recession of the external recti is indicated. Where exophoria is caused by convergence insufficiency and the external recti are normal in power, the normal external recti should not be disturbed. The operation of choice should then be a shortening of the internal rectus or recti as the case may be. In all cases it is, of course, of greatest importance that the case be well studied before operative interference is undertaken.

Sulfanilamide in Gonorrheal Ophthalmia, Luis J. Fernandez, M.D., and Ricardo F. Fernandez, M.D., *American Journal of Ophthalmology*, July, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. The authors treated 14 cases of ophthalmia neonatorum by administering doses of sulfanilamide beginning with a dose of 2.6 grams daily and tapering off to 1.95 grams daily. In all cases useful vision in the affected eye was retained and in eight cases healing occurred without corneal involvement. The authors recommend the judicious use of sulfanilimide in all cases of gonorrheal ophthalmia in adults, whenever there is no serious contraindication. They also suggest that further study be made regarding its possible use for treating ophthalmia neonatorum.

Light Reserve for Occupations in Sight-Saving Classes, R. A. Kaz, M.D., *The British Journal of Ophthalmology*, August, 1938, published monthly by the British Journal of Ophthalmology, Ltd., London, England. The author stresses the importance of proper lighting for sight-saving class pupils in Russia, where dark winter days make this problem especially important. Clinical histories of sight-saving class pupils accompany the article.

Book Reviews

AN INTRODUCTION TO CLINICAL SCOTOMETRY. John N. Evans, M.D., F.A.C.S. New Haven: Yale University Press, 1937. 266 p. ill.

This is modestly called "An Introduction to Clinical Scotometry," and the author disavows any pretension as a trained investigator, but the average reader will find it a treatise so complete with physiological and scientific details that he will have little or no need for further pursuit of the subject.

Scotometry has always been a fascinating study and Evans has managed to retain that fascination while developing his hypotheses from a wealth of factual minutiae. Instruments and methods are carefully explained, and interpretations are based upon sound experimentations and reasoning.

The type is clear and the text is lucid. The reading time is slowed down only because of the technical nature of the subject. There are 226 pages of subject matter, including charts and tables, and the book presents a pleasing appearance.

The serious worker will enjoy this study.

—WILLIS S. KNIGHTON, M.D.

EXTERNAL DISEASES OF THE EYE. Second Edition. Donald T. Atkinson, M.D., F.A.C.S. Philadelphia: Lea and Febiger, 1937. 718 p. ill.

That the second edition of this work has appeared so soon after the printing of the first is evidence of the very general recognition and approval with which it was received.

While much of this material has been available in scattered volumes on ophthalmology and dermatology and in general medicine and surgical textbooks, in none have external diseases of the eye been presented in English so completely and so well pictured as in this volume.

As in the first edition, the author prefaces his work with a brief retrospect of ophthalmology as relating to medicine. The early Egyptians, he tells us, had undoubtedly a degree of skill and a ra-

tional understanding of disease that were lost in subsequent periods.

The errors of the Galenic system were perpetuated through the centuries and it was not until the gulf between speculation and science began to be bridged by the Arabians that a new birth in philosophy, literature and medicine gave a renaissance in Arabic thought that preceded that in Europe by several centuries.

While the Mohammedan and the Christian were forbidding the desecration of the body by dissection, due to the superstitions of the times, the Jew with his analytical mind was outstripping his contemporaries and Maimonides of Spain was keeping alive and adding to what little was then known of ophthalmology.

To Italy, in the work of Vesalius, belongs credit for the earliest actual contributions to the structural formation of the eye, but it was not until the sixteenth century that Bartisch, a German barber surgeon, published a book, profusely illustrated by wood cuts, on diseases of the eye.

Some of the more obvious external diseases were well known to the ancients. Trachoma and purulent ophthalmia existed in Egypt at least 3,500 years ago, and pterygium was operated upon successfully in very early times. The work of the Italian, Antonio Scarpa, published in German in the early part of the century and translated into English in 1806, served as a groundwork for the later advances made by Stromeier, Dieffenbach, Beer and others, and after the invention of the ophthalmoscope by Helmholtz leading to the brilliant discoveries of von Graefe, Critchett, von Arlt and their long line of followers.

The author, after this brief summary, arranges his work in 15 chapters, treating of the eyelids, the lachrymal apparatus, the orbit, the conjunctiva, and the sclera, the iris and the ciliary body, with subdivisions given to the diseases to which each tissue is subject. This is followed by chapters on glaucoma, on the crystalline lens and the external ocular musculature.

The hygiene of the eye, history taking and case records are well considered, as are the remedial measures to be employed. The present edition includes, as the first did not, suggestions on slit-lamp microscopy, orthoptic training and allergic ocular manifestations, thus bringing the subject up to date.

The use of the slit-lamp is especially emphasized as it should be, because to the unaided eye many important external details are lost, and in many visible ocular conditions, such as the earlier stages of iritis, the slit-lamp is invaluable as an aid in differential diagnosis.

The author judiciously takes a conservative view on the effects of training on the amblyopic eye when he says that "when mechanical devices are used persistently and through periods sufficiently prolonged, defective fusion faculties have occasionally become normal, eyes with false fixation and false projection have sometimes been corrected, and strabismus has thereby been prevented or improved."

"Alternating strabismus with high degree of antipathy to fusion are not to any extent improved by the methods of orthoptic training now in use." This is a necessary warning where inexperienced enthusiasts are urging that orthoptic training classes be formed in our public schools.

The work is well written, printed on good paper, with clear type, admirably illustrated with photographs from nature or the wax models of distinctive cases, and should be of use not only to the general practitioner but as a source of reference to the specialist in external diseases of the eye.

—PARK LEWIS, M.D.

A TEXT-BOOK OF OPHTHALMIC OPERATIONS. Harold Grimsdale, M.B., F.R.C.S., and Elmore Brewerton, F.R.C.S. Baltimore: William Wood and Co., 1937. 322 p. ill.

The reader might question the aptness of the title of this book when he fails to find several well known operative procedures, *e.g.*, Reese's muscle resection. On the other hand, he will probably find many others that he never heard of before.

Operative habits and preferences tend to follow geographical and temporal trends and unless one finds a good many old friends in a book of this kind, one is inclined to feel that something is lacking. The authors have not attempted to produce an encyclopedic work; their chief concern has been "to give the student, in outline, the chief ways in which the various problems have been attacked."

They admit that this plan has led them to include a good many operations primarily of historical interest. The presentation of the

material is excellent and the schematic drawings are adequate, but it might have been better had some of the sections been cut down. Lid operations take up fifty pages and detachment of the retina only seven.

There is little that is new concerning the operations listed, but the authors pride themselves mainly on their arrangement of the material and the choice of operations.

The book contains 322 pages, including the index and an extensive bibliography. The paper is fair but the type appears somewhat crowded.

—Willis S. Knighton, M.D.

School Nursing—A Contribution to Health Education. Revised and Enlarged Edition. Mary Ella Chayer, R.N., A.M. New York: G. P. Putnam's Sons, 1937. 329 p. ill.

Miss Chayer is recognized as a leading authority in the field of school nursing. The National Society for the Prevention of Blindness, therefore, looks with pride on the first part of Chapter V, which is concerned with the nurse's part in the conservation of vision, as presented in this revision.

Not only has Miss Chayer brought her data up to date, but she has quoted from the Society's publication, "Conserving the Sight of School Children," for the principles and techniques of vision testing.

There are a few minor details this reviewer would like to have amplified. For instance, "light from left side" is correct for the right-handed child when he is at work because otherwise his hand would cast a shadow on his work. But with the left-handed child, just the reverse is true. Again, because it is impossible to keep any text abreast with changing standards, it would seem desirable to refer students to standard setting groups rather than to quote a standard which a few months later may be altered. In relation to school lighting, the standard for desk illumination was changed from 10 foot-candles to 15 foot-candles, according to the *American Recommended Practice of School Lighting*, 1937, almost immediately after Miss Chayer's revised edition was published. Another value in this procedure is that it avoids the necessity of making generalizations to conserve space. Such generalizations frequently result

in inadequate and superficial knowledge which may lead to erroneous conclusions.

The author has, nevertheless, given an excellent and concise presentation of the nurse's function in conserving the sight of school children.

—ELEANOR W. MUMFORD, R.N.

Briefer Comments

TEACHING FOR HEALTH. Marguerite M. Hussey, Ph.D., New York: New York University Bookstore, 1938. 312 p.

This text covers the fundamentals of health instruction for teachers, giving brief, but adequate, attention to the problems of vision and lighting. The value of the book for sight-saving class teachers is slight in that the visual problems discussed are of a general nature. Although reference is made to the peculiar problems presented by the child with defective vision, it is unlikely that any of this information is new to the trained sight-saving class teacher.

SAFETY FIRST—AND LAST. Charles E. Dull. New York: Henry Holt and Co., 1938. 262 p. ill.

The title of this book is somewhat misleading in that it gives the impression that the text deals with safety practices in general, whereas it is actually limited to safety on the highway. As such, the book is clearly and intelligently organized and attractively illustrated. Its references to vision are confined to a brief description of glare and highway illumination and a passing reference to the vision tests which are given to applicants for a driver's license.

INTENSIVE RURAL HYGIENE WORK IN NETHERLANDS INDIA. J. L. Hydrick, M.D. Batavia-Centrum, Java, Netherlands India: January, 1937. 62 p. ill.

A study of public health practices adapted to the special needs of the natives of Netherlands India, largely concerned with problems of sanitation and prevention of disease. The book is copiously illustrated with photographs and charts showing the advances that are being made under intelligent medical supervision.

Books Received

REMEDIAL READING DRILLS. Thorleif G. Hegge, Ph.D., Samuel A. Kirk, Ph.D., and Winifred D. Kirk, M.A. Ann Arbor: George Wahr, Publisher, 1936. 66 p.

MANUAL OF DIRECTIONS FOR USE WITH THE HEGGE-KIRK REMEDIAL READING DRILLS. Samuel A. Kirk, Ph.D. Ann Arbor: George Wahr, Publisher, 1936. 50 p.

AN APPROACH TO CHORAL SPEECH. Mona Swann. Boston: Walter H. Baker Co., 1937. 79 p.

SHADOW ON THE LAND. Thomas Parran, M.D. New York: Reynal and Hitchcock, 1937. 309 p. ill.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

273. Illumination Levels and Eye Comfort Conditions, Walter B. Lancaster, M.D. 12 p. 10 cts. Discusses comfortable lighting, including the psychological aspects.

274. One-Eyed Drivers, H. R. DeSilva, W. H. Frisbee, Jr., and P. Robinson. 12 p. 10 cts. Describes the visual limitations of one-eyed persons as automobile drivers.

275. Organization of Social Forces for Prevention of Blindness, Audrey M. Hayden. 12 p. 10 cts. Describes the work of the Illinois Society for the Prevention of Blindness in securing important legislation.

276. What Social Workers Should Know About Preventable Causes of Blindness, Eleanor Lee Hearon. 12 p. 10 cts. The author discusses the symptoms and treatment—from both the medical and social service viewpoints—of some common causes of blindness.

277. Syphilis in Eye Clinics, Robert R. M. McLaughlin, M.D. 4 p. 5 cts. Maximum efficiency in eye clinics requires routine Wassermann blood tests for each patient; maintenance of social service departments; and use of uniform methods of recording.

278. Possibilities for Prevention of Blindness in the Public Assistance Program, Eleanor Brown Merrill. 8 p. 5 cts. Presents the responsibilities of public assistance workers, prevention of blindness workers, and health officers and nurses in the campaign against blindness.

279. "The Nurse's Responsibility in Saving Sight"—a New Talking Slide Film. 6 p. A pictorial description of a talking slide film prepared especially for work with nurses.

D121. The Rôle of the Institutional Nurse in the Treatment of Ophthalmia Neonatorum, Bernice Perdziak, R.N. Reprinted from *Hospital Management*, February, 1938. 4 p. $1.50 per 100. Outlines procedure in handling ophthalmia neonatorum.

D122. Classification of Causes of Blindness. Committee on Statistics of the Blind, 1938. 4 p. Presents etiological and topographical classifications.

D123. Recommendations: Essential Steps in the Attack on Blindness. Committee on Statistics of the Blind, 1938. 6 p. Presents 10 recommendations.

Contributors to This Issue

Dr. Walter B. Lancaster, a member of the Society's Board of Directors, is a practicing ophthalmologist in Boston.

Mr. H. R. DeSilva, Mr. W. H. Frisbee, Jr., and **Mr. P. Robinson** have been affiliated with the Bureau for Street Traffic Research at Harvard University, Cambridge, Mass.

As executive secretary of the Illinois Society for the Prevention of Blindness, **Miss Audrey M. Hayden** is an outstanding personality in the field of sight conservation.

A former scholarship student of the National Society for the Prevention of Blindness, **Miss Eleanor Lee Hearon** is now director of medical social service at the Colorado General Hospital in Denver.

On behalf of the Social Hygiene Committee of the New York Tuberculosis and Health Association, **Dr. Robert R. M. McLaughlin** prepared his survey of syphilis in eye clinics.

The program of medical social eye work of the National Society for the Prevention of Blindness has been developed chiefly through the efforts of **Mrs. Eleanor Brown Merrill,** an associate director.

Book reviewers: **Dr. Willis Knighton,** assistant surgeon at the New York Eye and Ear Infirmary; **Dr. Park Lewis,** first vice-president of the National Society for the Prevention of Blindness; **Miss Eleanor W. Mumford,** the Society's associate for nursing activities.